ECHNOLOGY DEPT:

ROADS AND STREETS

SEPTEMBER, 1944

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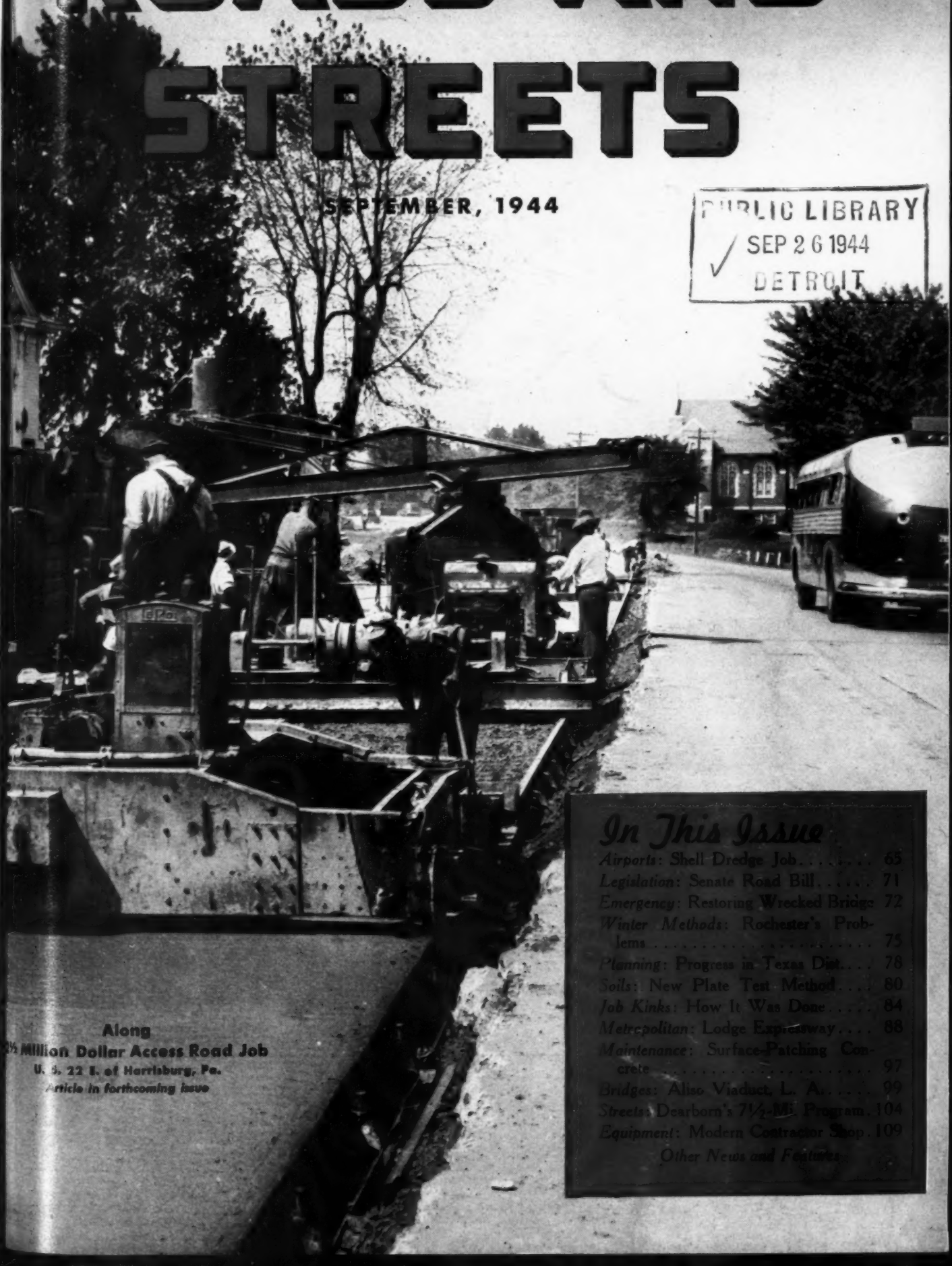

Along
2½ Million Dollar Access Road Job
U. S. 22 E. of Harrisburg, Pa.
Article in forthcoming issue

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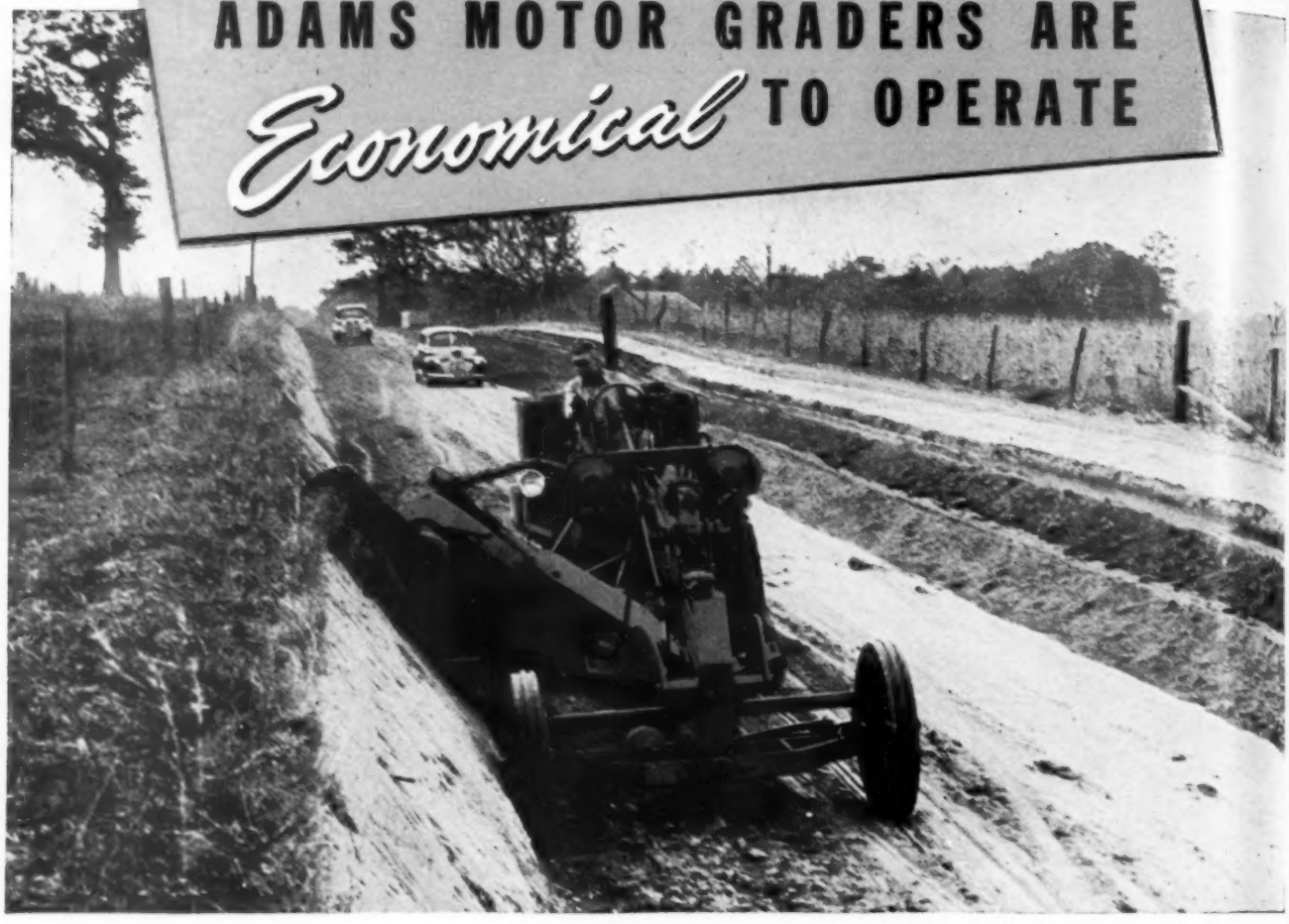
ADAMS MOTOR GRADERS ARE *Economical* TO OPERATE



One of a series of ads on Adams motor grader features

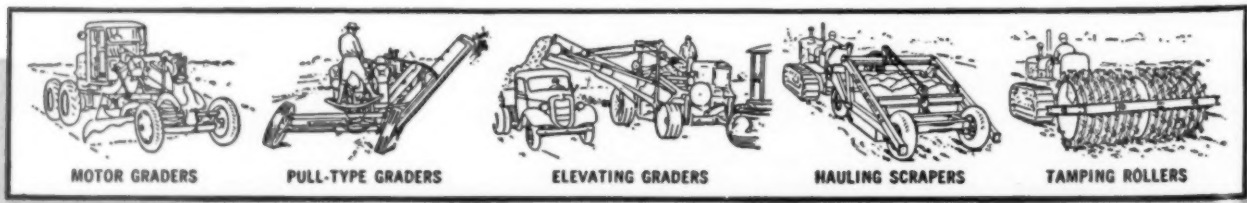
ECONOMICAL motor grader operation involves two considerations—(1) daily operating cost and (2) the machine's ability to stand up under hard usage without excessive repairs. On both considerations Adams are tops.

As to fuel consumption, there are plenty of Adams heavy-duty motor graders doing hard work today on two gallons or less of low-priced Diesel fuel per hour . . . As to maintenance, Adams machines, with their strong, all-welded and machine-finished construction, seldom need repairs; use the adjustments for wear and they will run for many months without repair parts. The International Diesel engines used have enviable records for economy and when repairs are needed, parts and service are readily obtainable anywhere at fair prices.

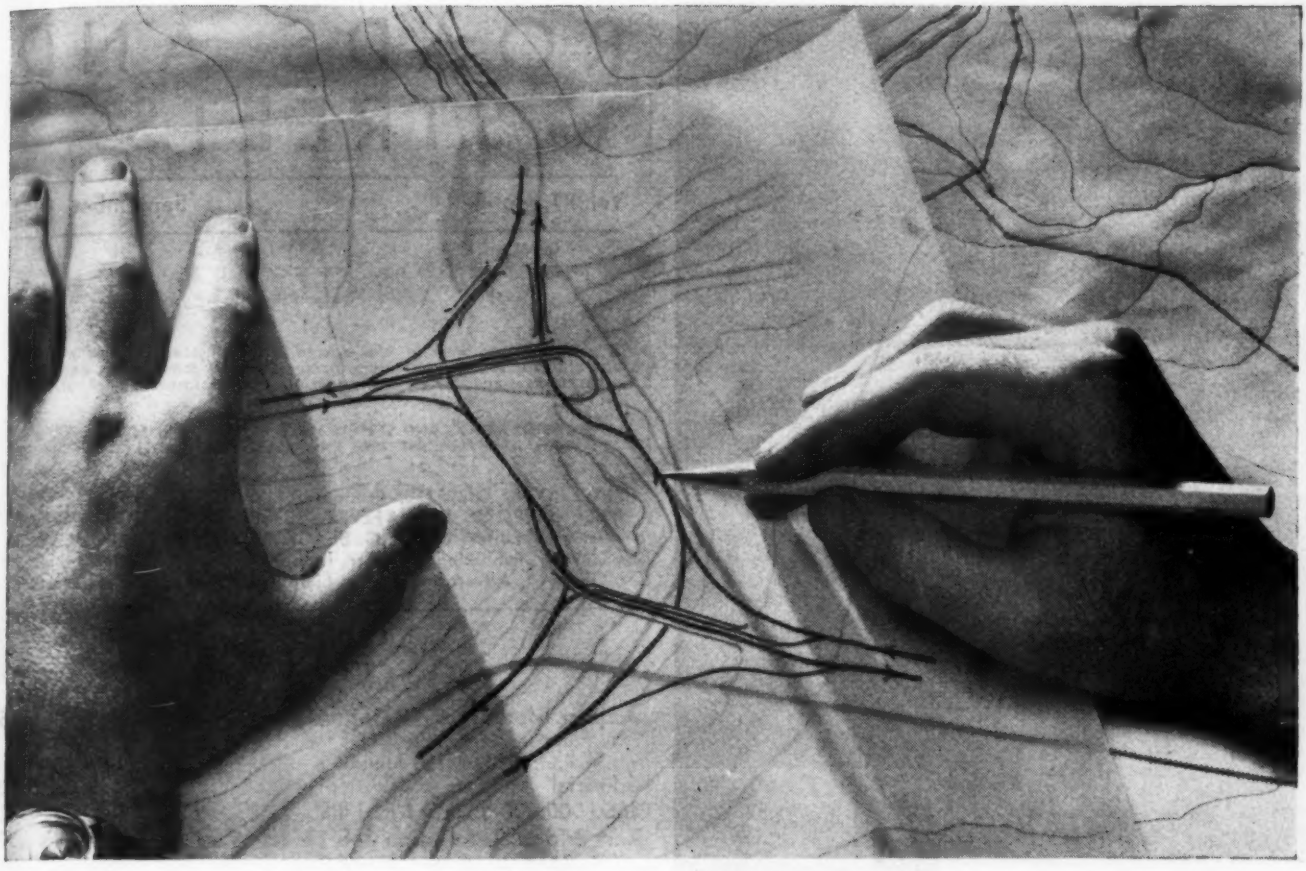
Add to this economy of operation their ability to adapt themselves to a wide variety of work, their abundance of power and their ease of operation and you have in Adams motor graders all of the qualities you are looking for. Plan now to standardize on Adams and ask your local Adams distributor for further details.

J. D. ADAMS COMPANY • INDIANAPOLIS, IND.

At war's end we'll need many new roads and many jobs for returning service men. Plan post war projects now and meet both needs.



ADAMS ☆ ROAD-BUILDING AND ☆ EARTH-MOVING EQUIPMENT



Planning tomorrow's highways . . . today

America's highways have served the nation well, but taken plenty of punishment in this war. Many of them will need heavy repairs when it's over. Some will be completely rebuilt, even relocated.

What is it going to cost to put our highway system in shape to take care of post-war traffic? Long-term projects to cost $7,000,000,000 have already been definitely proposed by State officials.

In the view of some authorities, expenditures could well run as high as $1,630,000,000 a year—nearly three times as much as in 1940, the previous peak year. The American Road Builders' Association favors an even larger program—$3,000,000,000 a year for postwar highway construction (including new bridges to be built and existing ones to be widened).

The magnitude of the job stirs the imagination. Doesn't it set you to thinking about the mountains of earth to be moved, the tons of concrete to be poured and steel to be set in place, the battalions of men to be put to work at useful, lasting projects?

It's a vast undertaking that faces the nation's highway engineers and contractors. In making plans for shouldering your share of it, give some thought to the time-saving, money-saving service which Bethlehem offers. When construction gets under way, you can quickly fill all your road-steel needs through a Bethlehem warehouse near you. Thus you'll avoid confusion, extra work, delays and duplication.

Bethlehem Road Products

REINFORCING BARS AND BAR MATS • DOWELS • STEEL H AND Z PILING
DOWEL BAR SUPPORTS • TURNBUCKLES • HIGHWAY GUARD RAILS • CABLE
HIGHWAY GUARD • STEEL HIGHWAY POSTS • ROAD JOINTS • GUARD
RAIL ANCHOR RODS • CABLE BRACKETS • STEEL SHEET PILING • BAR TIES
WIRE ROPE AND STRAND

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

FOR SIGNS
...EASIER
TO READ!

The clarity and legibility of this 36" Scotchlite stop sign is a good example of the advantages of over-all sign reflectorization. There's no glare of the reflective background and no distortion of the sign lettering.

Night or day sign appearance is identical—in color, in size and shape. Only with Scotchlite are you assured these features.

You'll find Scotchlite an easy reflective material to handle and apply too, as no drilling of holes, bolts, housing, etc., are necessary for application. The saving of time is outstanding.

Find out how Scotchlite can fit into your sign program... Write today for prices and complete information.

Scotchlite
REG. U. S. PAT. OFF.
REFLECTIVE SIGN MATERIAL 24 Hour Visibility

MFRS. 3-M PRODUCTS

MINNESOTA MINING AND MANUFACTURING CO.
GENERAL OFFICES SAINT PAUL 6 MINN
BRANCHES IN PRINCIPAL CITIES

ROADS AND STREETS

Vol. 87, No. 9 September, 1944

CCA

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

HALBERT P. GILLETTE, President; EDWARD S. GILLETTE, Publisher; HAROLD J. McKEEVER, Editor; CHARLES T. MURRAY, Managing Editor; JOHN C. BLACK, Field Editor; LT. COL. V. J. BROWN, Publishing Director (Absent on Military Duty); H. J. CONWAY, Advertising Editor; L. R. VICKERS, Promotional Director.

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How to S-T-R-E-T-C-H the life of your war-weary equipment

DURING the past 18 months, hundreds of Lorain owners and operators have found the Emergency Fix-It Handbook a big help in keeping going—and it can do the same for anyone else who is struggling along with continued use of aging equipment—working at longer hours, under heavier wartime loads, encountering delays in spare parts deliveries.

This 28-page Handbook contains 32 ideas on how to rebuild worn parts for further use—how to substitute for critical, hard-to-get materials—how to make emergency repairs that will keep your unit on the "front line". Though written for Lorain cranes and shovels, most of the methods given, with no or only minor modifications, may be applied to many other makes of cranes and shovels—and even to many other types of construction equipment.

Even with our war successes, no one yet knows when new equipment will again be available. In the meantime you must keep producing. Therefore, isn't it worth sending a penny postal request to Thew-Lorain and getting a copy of this helpful Emergency Fix-It Handbook? Do it today—there's no obligation.

THE THEW SHOVEL COMPANY • Lorain, Ohio

Reg. Trade Mark

thew-Lorain

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

How many days of freezing weather in your state?*

*important to road maintenance officials

WAR *hasn't* changed the weather. Your own experience tells you what you may reasonably expect each winter. Experience tells you, too, that keeping roads and streets open and safe — despite snow and ice — is a job that calls for careful planning well in advance of winter.

This year, more than ever before, plans and purchases must be made earlier — must take into consideration overburdened shipping facilities, your own manpower and equipment deficiencies.

Sterling "Auger-Action" Rock Salt can help solve this winter's ice and snow problems for you. If you're short on manpower or equipment consider: 1) Rock Salt, applied early in the storm, prevents snow from packing and bonding to the pavement — makes complete removal fast and easy. 2) Rock Salt, used straight without abrasives, can effectively treat five times as much street surface as other ice control materials, thereby saving time-consuming hauls from supply points. One crew, one piece of spreading equipment does the work of five using old-fashioned methods.

Top these important war-time advantages with the proved fact that Sterling "Auger-Action" Rock Salt is the least expensive, fastest and most effective ice control agent for streets and highways. Figure your requirements *now* so that winter's first storm will find you prepared for fast, effective action.

Let Our Engineers Help Solve Your Ice Control Problems

Highway Departments have shown savings of ⅓ to ½ by using Sterling Rock Salt for ice control. Write today for bulletin of facts on the most efficient and economical solution to your snow and ice removal problems. Free consultation with an International Field Engineer upon request. International Salt Company, Inc., Dept. RS-9, Scranton, Pa.

STERLING *"Auger-Action"* ROCK SALT

FIFTEEN NORTHWESTS

for

PETER KIEWIT

Sons' Company

Omaha, Nebraska

Here's one of those dirt jobs we've been talking about—and here's one of the many well known contractors that gets things done and buys Northwests again and again for results, because he knows that if you have a real Rock Shovel, you are equipped for output in any kind of digging.

Fifteen Northwests—fourteen repeat orders is a lot of testimonial to service, particularly when the service includes practically every type of work from the ordinary road job to the Iron Range.

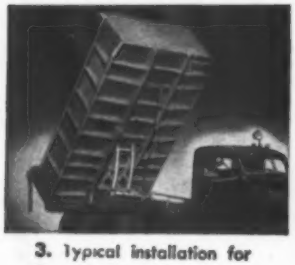
Concerns like Peter Kiewit Sons don't make mistakes in buying machinery, and a shovel that will make money for them will make money for you.

NORTHWEST ENGINEERING CO., 1727 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.

—When you have a real Rock Shovel the output in dirt is always high!

1. Direct-Lift Hoist. Body has Trussed Understructure. Exclusive feature.

2. Cam and Roller Hoist for long wheelbase chassis. High ground clearance for piling.



3. Typical installation for Six Wheelers.

4. Telescopic Hoist. Heavy-Duty Body.

5. Dual Telescopic Hoist and Rock Body. Down Folding Gate.

6. Vertical Telescopic Hoist for long Bodies.

7. Tanks for all types of liquids.

8. Street Flushers and Sprinklers.

GW

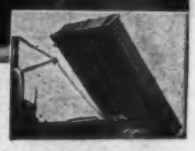
GAR WOOD TRUCK EQUIPMENT

HOISTS • BODIES • TANKS WINCHES and CRANES For TRUCKS and TRAILERS

GW engineers specialize in designing the type of equipment best suited for the work to be performed. Gar Wood Industries, Inc., manufactures hydraulic and mechanical hoists, dump bodies, winches, cranes and tanks (including flushers and sprinklers) for a wide variety of uses on trucks and trailers.

9. Hydraulic Repair Tower.

10. Cranes — all types and sizes for handling pipe, machinery, etc.

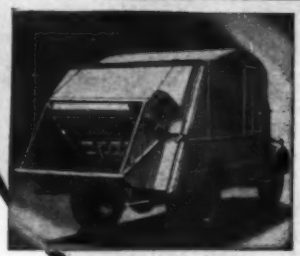


11. Crane with Winch and Dump Body.

Refer to Picture Number when ordering literature

12. Tree-Moving Crane.

13. Picks up, transports and resets treeballs.



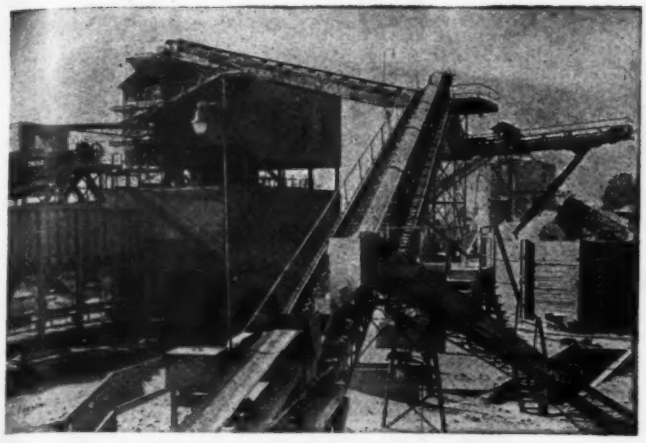
14. Load-Packer — compresses garbage and rubbish. Greater loads—fewer trucks and men required.

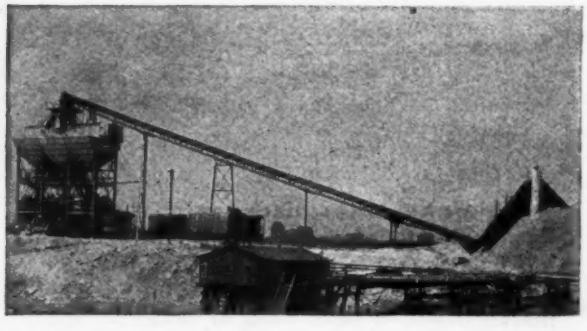
GAR WOOD INDUSTRIES, Inc.
DETROIT 11, MICHIGAN

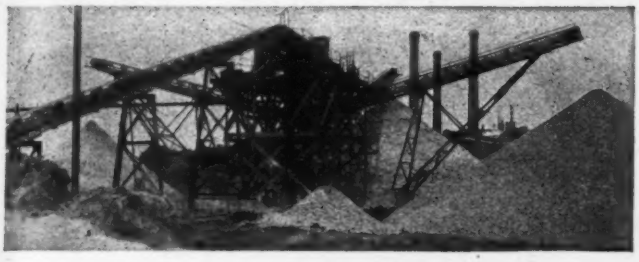
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

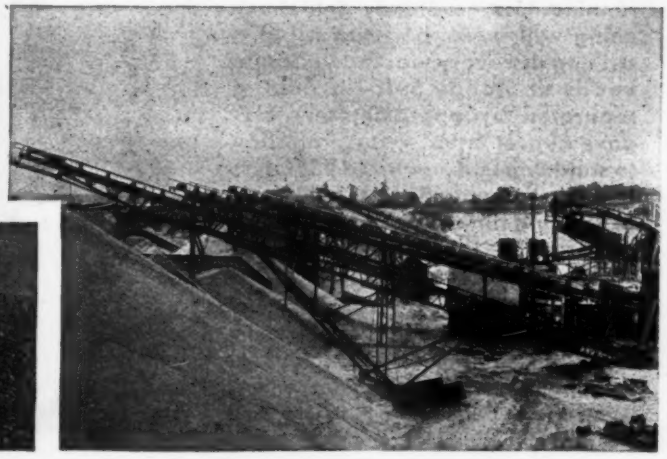
GAR WOOD GW INDUSTRIES, INC. TRADE MARK

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT









CUSTOM BUILT

With Standard Units....

Typical of the Barber-Greene concept of Standardized Sectional Conveyor construction are the installations shown here. The belt conveyors used in these plants consist, for the most part, of standard units, pre-engineered and designed for production manufacture. These standard terminals, trusses, carriers, A-frame supports, and take-ups are available in a wide range of sizes and horsepower to meet a custom engineered application.

The Barber-Greene Engineering Department will assist you in utilizing this equipment to best advantage. It is equipment that can be expanded as your plant grows merely by adding standard units. Barber-Greene Co., Aurora, Ill., U. S. A. 44-26

BARBER GREENE

AURORA, ILL., U. S. A.

STRINGER BEADS CHEAT WEAR...

on POWER SHOVEL BUCKETS!

Typical Stringer Bead Application

LIKE many other discoveries, knowledge of wear protection has been increased by its share of lucky accidents. Whether the welder merely tried to save time or was running low on Stoody Self-Hardening will never be known, but a striking discovery was made: Single beads of Stoody Self-Hardening separated by approximately 1½" gave almost equal wear protection to solid deposits, required 25% less hard metal and saved many hours of welding time, especially on large surfaces! So, through accident, the stringer bead was born.

Experiments prove the stringer bead an ideal method of protecting many types of equipment—not only for reasons listed above, but for others. Manganese parts subject to cracking because of welding temperature differences can now be safely hardfaced with stringers by alternating the position of consecutive beads. *Of greatest importance is the advantage of earth packing between the stringers,* which forms a constantly renewing earth layer between the wearing metal and the moving material. Illustrated is a typical stringer application on a dragline bucket with beads crossed in a checkerboard pattern to increase earth packing.

Stoody Self-Hardening is the ideal hardfacing alloy for protecting earth working equipment. Being of high chrome-manganese content it bonds extremely well with the manganese steels so commonly used. Stoody Self-Hardening resists chipping, offers considerably greater wear resistance than manganese, yet costs only a few cents more per pound than manganese electrodes. (Stoody Self-Hardening sells for 50¢ per lb., f.o.b. Whittier, California, or distributor's warehouse). To get double the life from wearing bucket parts, try 100 lbs. of Stoody Self-Hardening today—available from 600 U. S. distributors in all principal cities.

STOODY COMPANY

1125 WEST SLAUSON AVE. • WHITTIER, CALIFORNIA

STOODY HARD-FACING ALLOYS

Retard wear . . . Save Repair

YOUR BEST BET
WHEN THE WAR ENDS

A FEW GOOD TERRITORIES STILL AVAILABLE TO INTERESTED DISTRIBUTORS

The benefits we have gained in building hundreds of road rollers for the army and our allies . . . up-to-the-minute facilities . . . modern production methods . . . the testing and proving of many new and important developments . . . will be generously shared with roadmen when the war ends. Bear this in mind before buying a new road roller — your best bet will be a HUBER.

HUBER ROLLERS

THE HUBER MFG. COMPANY · MARION, OHIO, U.S.A.

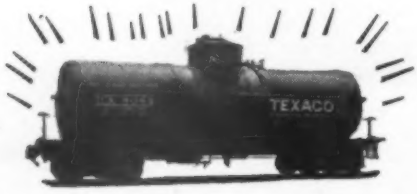
HOT OIL...

...MAKES FAST WORK OF THAT OILING PROJECT

THE tank-car on the siding is the starting point for fast work on any oiling project. The quicker you get the oil or asphalt up to application temperatures and flowing into the distributors — the faster your road crews can get going.

With a Cleaver-Brooks tank-car heater you have hot dry steam flowing to the car coils from a cold start in 20 minutes or less. And you can keep going all day with the least work and bother because a Cleaver-Brooks tank-car heater asks less in fuel and water. The famous and exclusive four-pass flue travel means low fuel consumption; the turbine type condensate return system cuts water loss — every drop of condensate goes back to the heater under pressure.... Built for full capacity — full-time work — Cleaver-Brooks tank-car heaters will give you the most in production hours on the job. Wherever in service, Cleaver-Brooks are usually given the tough jobs because of their known reliability.... Write today — get full information from Cleaver-Brooks — the pioneers and originators of tank-car heaters and bituminous boosters.

GET HOT OIL— FAST — WITH LESS WORK — FUEL— WATER



Not just a "boiler on wheels" but a rugged, compact, highly perfected steam generator built by specialists in steam generating equipment.

★

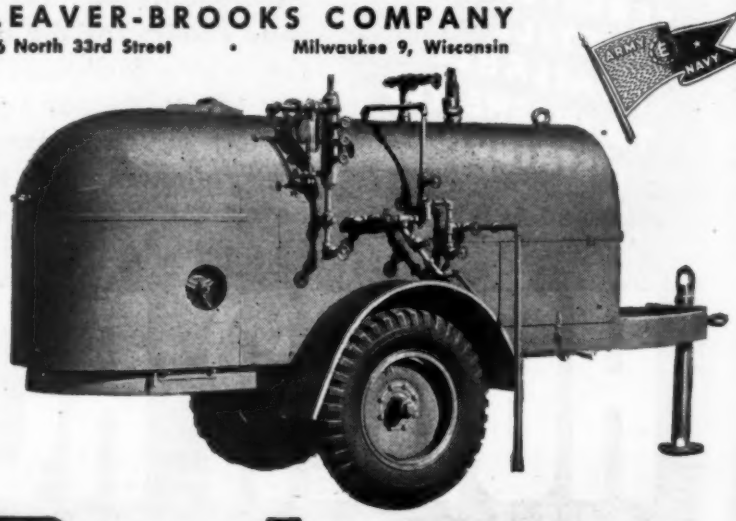
The only tank-car heater with the fuel-saving four-pass flue travel construction. No water problem — full condensate recovery and return to heater under pressure.

★

An all-purpose unit—provides steam wherever and whenever needed — for heating, thawing, cleaning.

CLEAVER-BROOKS COMPANY

5106 North 33rd Street • Milwaukee 9, Wisconsin



Cleaver-Brooks

PIONEERS AND ORIGINATORS OF

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS

Help Accomplish the Mission!

Roaring defiance, bombers and escort fighters break the Pacific silence as they take off for the next objective. Below are the men with their machines who carved out the base that made this mission possible . . . who even now plan to follow up the bombers with another invasion thrust.

It takes hands and hearts of steel to beat back a swamp-laden jungle, infested with every type of reptile and disease carrying agent . . . to withstand unbearable heat and gnawing homesickness. As one Seabee said, "People back home cannot by any stretch of the imagination realize the tremendous amount of hard work that must be done before the smallest effort can be exerted against the enemy."

Courage and determination to see the job finished . . . modern, fast-moving tractors operating bulldozers, giant-sized scrapers and other grading equipment are the fighting tools of our construction battalions. A winning combination . . . and one that deserves the backing of every last one of us!

While they give all, we can give a little! Let's keep on buying War Bonds, Donate Our Blood, Conserve Food, Salvage Scrap and do the other small things asked of us. Let's help accomplish the mission!

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

BACK THE ATTACK . . . BUY MORE WAR BONDS THAN BEFORE!

THE *Right* MODEL FOR *Every* PAVING BREAKER JOB!

CLEVELAND C11

This 58-lb. tool has a long stroke and strikes a very heavy blow. It is noted for its economical air consumption.

CLEVELAND C9

Weighs 82 lbs., and is a slugger suitable for reinforced, well-seasoned concrete. A No. 85 compressor operates two.

CLEVELAND C7

This 80-lb. model is best for all around work on paving breaking and demolition jobs. Two C7's run from a No. 85 compressor.

CLEVELAND C10

This is a smaller (35-lb.) model for light work, trimming, etc. Three C10's run from a No. 85 compressor.

CLEVALOY CHISELS, MOILS, TOOLS

Moil Point | Narrow Chisel | Wide Chisel | Digging Blade | Sheeting Driver | 2" Tamper Bar | 5" Tamper Bar | Clay Blade | Clay Spade | Asphalt Cutter

Prompt delivery out of stock
Write for Bulletin 128

THE CLEVELAND ROCK DRILL CO.

Division of The Cleveland Pneumatic Tool Co. • CLEVELAND 5, OHIO

BRANCH OFFICES: Birmingham, Ala.; Boston, Mass.; Buffalo, N. Y.; Butte, Mont.; Chicago, Ill.; Cincinnati, O.; Dallas, Texas; Denver, Colo.; Detroit, Mich.; El Paso, Texas; Ironwood, Mich.; Lexington, Ky.; Los Angeles, Calif.; Milwaukee, Wis.; New York, N. Y.; Philadelphia, Pa.; Pittsburgh, Pa.; Richmond, Va.; Salt Lake City, Utah; San Francisco, Calif.; St. Louis, Mo.; Wallace, Idaho; Washington, D. C.

Canadian Distributors: Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.

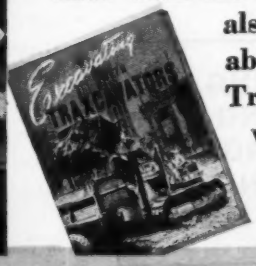
Loading Gravel from Stock Pile

Basement Excavation

Road Widening

MASTER OF ALL JOBS

TRAXCAVATORS are the world's most versatile earth and material moving machines. In addition to digging and loading, they ditch, cast, carry, spread, backfill, level, and do a host of other tasks. Highly mobile, TRAXCAVATORS travel around jobs under their own power at speeds up to six miles per hour . . . can readily be transported on streets and highways. Powered by "Caterpillar" track-type tractors, with bucket capacities from ½ to 2½ cubic yards. Bulldozer blade, quickly interchangeable with the bucket, and other attachments also available. Get the facts now, about TRAXCAVATORS from your Trackson-"Caterpillar" dealer or write for informative booklet to TRACKSON COMPANY, Milwaukee 1, Wisconsin.



TRAXCAVATOR

The Original Tractor Excavator

BREAKING
DRILLING
DRIVING
TAMPING
CRIB BUSTING

BARCO

PORTABLE

GASOLINE HAMMER

With a Barco Portable Gasoline Hammer in his hands, any workman, regardless of his stature, becomes a giant of strength. A Barco enables one man to do the work of several . . . under rugged conditions . . . in hard-to-reach spots . . . and at low operating cost. Eleven special tool attachments make this self-contained unit adaptable to a wide range of jobs. Write for additional information to: The Barco Manufacturing Company, Not Inc., 1815 Winnemac Ave., Chicago 40, Illinois.

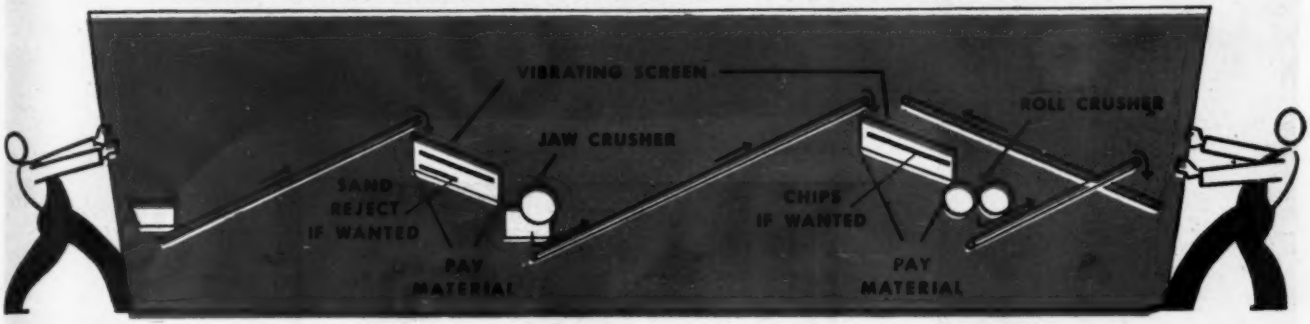
•

In Canada: The Holden Co., Ltd., Montreal

THE FREE ENTERPRISE SYSTEM IS THE SALVATION OF AMERICAN BUSINESS

BOTTOM DECK FEED *Produces more!*

THE PIONEER DUPLEX GRAVEL PLANT

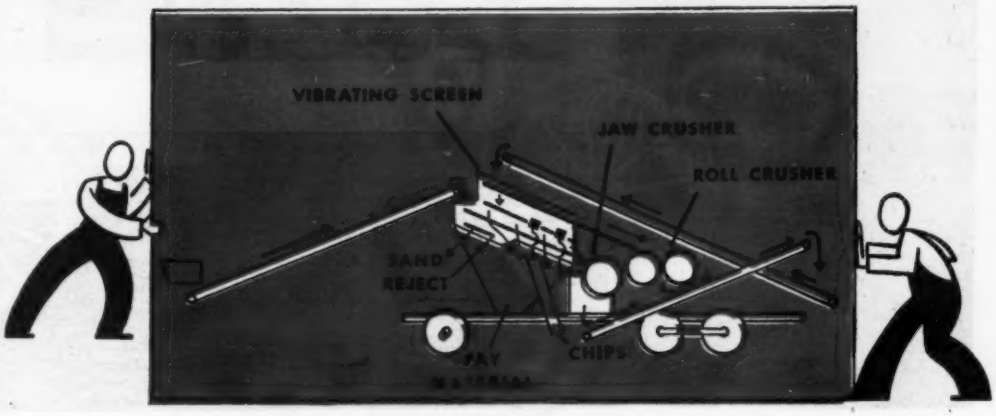


SPREAD IT OUT

Here is how the equipment in a Pioneer Duplex Crushing and Screening Plant would look if it were spread out in separate units.

PUT IT TOGETHER

In the Pioneer Duplex Plant all this equipment comes in one compact package, on one set of pneumatic tired trucks, due to the ingenious, exclusive Pioneer "Bottom Deck Feed." Here is how it is arranged. The pit material is fed onto the bottom deck—throughs go to the pay material hopper—material retained goes to jaw crusher. Crushed rock is fed to top deck—throughs are carried on blank middle deck and by-passed around bottom deck directly into pay material hopper, material retained on top deck goes to roll crusher and then back to screen.



Here are the advantages of the Bottom Deck Feed:

1 Doubles the screen area producing pay material. Both top and bottom decks produce pay material.

2 Increases crusher output. The work of both crushers is balanced by opening or closing jaw crusher, thus keeping both crushers working to maximum efficiency and capacity.

3 Crushed material is not mixed with pit run material on screen.

4 "Stone Chips" can be produced without additional equipment.

Pioneer "Bottom Deck Feed" Gravel Plants are built in five sizes for every gravel requirement. There is one size that will answer your problem. Let us show you the advantages on your specifications.

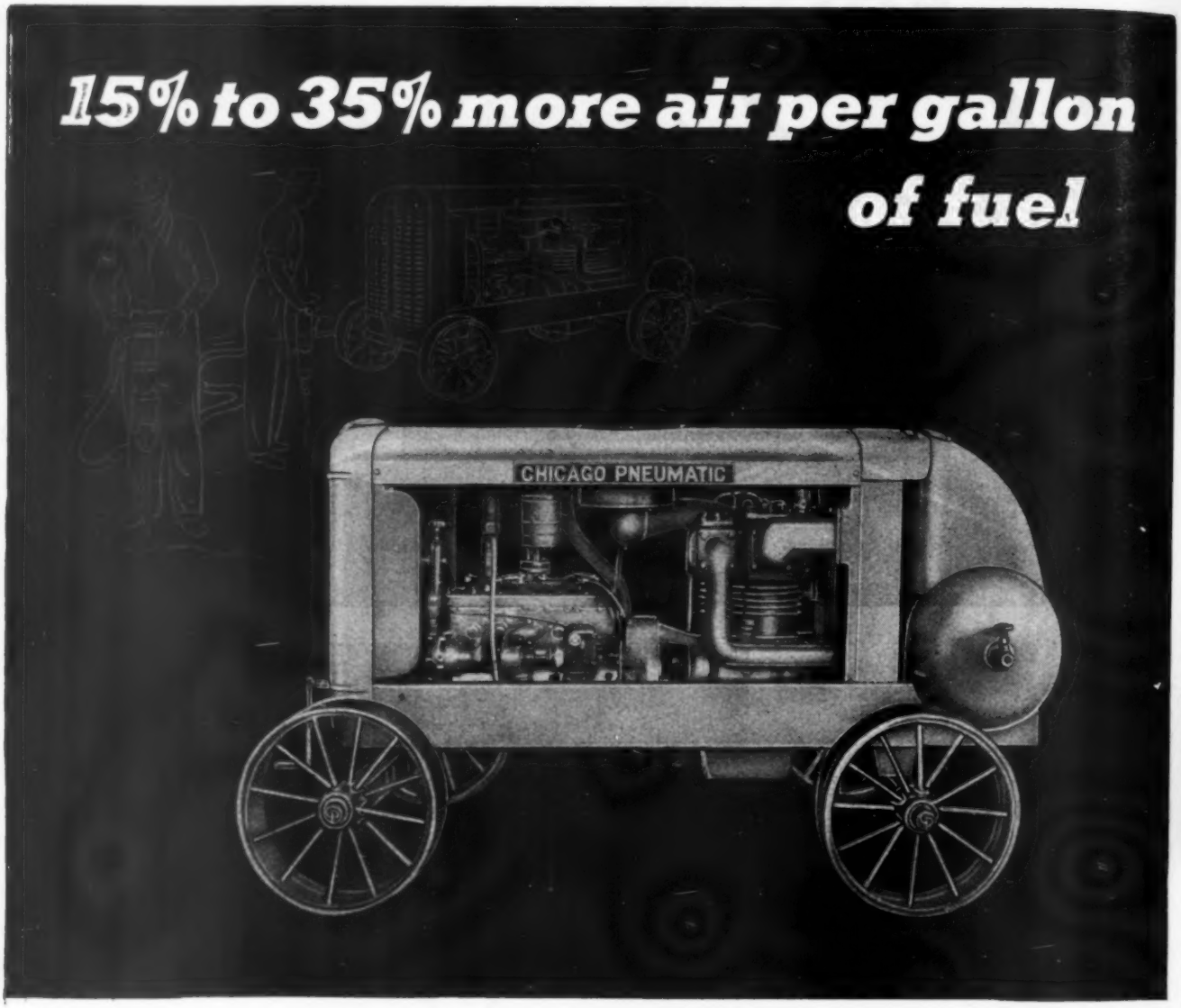
PLAN WITH

Pioneer
ENGINEERING WORKS
Crushers • Screens • Conveyors • Feeders and Portable Plants
MINNEAPOLIS 13, MINNESOTA

ENGINEERS and MANUFACTURERS of QUARRY-GRAVEL AND MINING MACHINERY

FOR PROFITABLE PRODUCTION

15% to 35% more air per gallon of fuel



CP PORTABLE COMPRESSORS

AN outstanding feature of CP Portable Compressors is the gradual speed regulator. Synchronizing engine speed with air demand, it varies the speed—not by steps but gradually — up and down, exactly as air demand varies. The result is a marked economy of fuel and a reduction in engine wear. CP's complete line of gasoline and Diesel powered compressors offers greater portability due to lighter, more compact construction. For full information write for Bulletin 758-2.

Chicago Pneumatic Portable Compressors are available in gasoline powered models of 60, 105, 160, 210 and 315 c.f.m.; and in Diesel powered sizes of 105, 160, 210, 315 and 500 c.f.m.; with steel wheels, pneumatic-tired wheels or skid mountings.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N.Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

More Snow...Less Man-Power...
Won't "Stump" FWD "Truck-Power"

Husky FWDs like this make a clean sweep of the snow removal problem for Douglas County, Nebraska.

SNOW, this year, will be a more serious problem than ever before on highways . . because less manpower is available. FWDs will not be "stumped" by this handicap! They are no amateurs at snow removal . . . nor at many other heavy-duty jobs they perform reliably and economically in road maintenance and construction.

The same FWDs that served through spring, summer and fall can be snow-plow equipped and quickly converted to snow removal duty. Equipped with underbody type scrapers, the same trucks will strip ice sheets or ruts from roads.

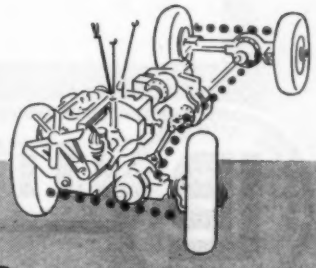
With power and traction on all four wheels, plus ruggedness that withstands toughest service, FWDs continue to deliver more "truck-power" as the effective answer to less manpower for highway service.

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wisconsin

Canadian Factory: KITCHENER, ONTARIO

FWD TRUCKS

Trade-Mark of the Original and Exclusive Builders of Four-Wheel-Drive Trucks.

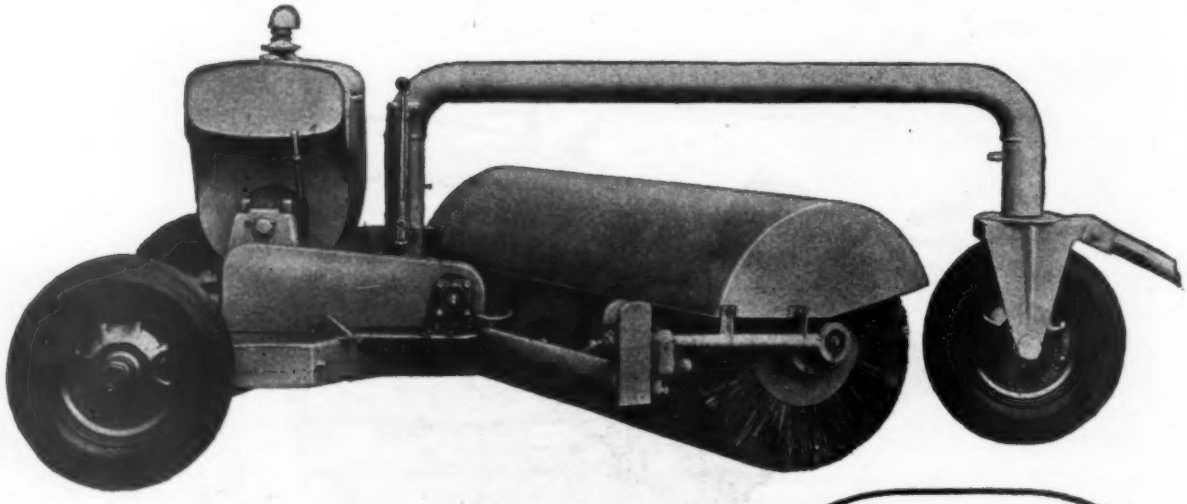


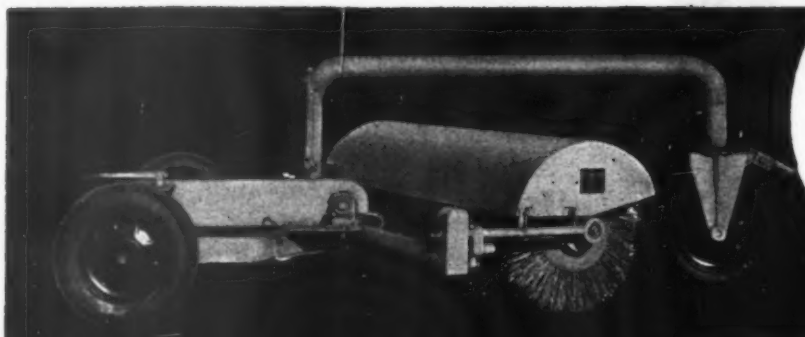
Four-Wheel-Drive . . . THE BACKBONE OF RUGGED, DEPENDABLE TRUCK HAULING POWER

The true application of four-wheel-drive with center differential provides ability to get through under difficult conditions — increased surety and safety on the road — lower operating cost per ton-mile — long service life.

COMMERCIAL CONSTRUCTION UTILITIES OIL FIELDS MILITARY

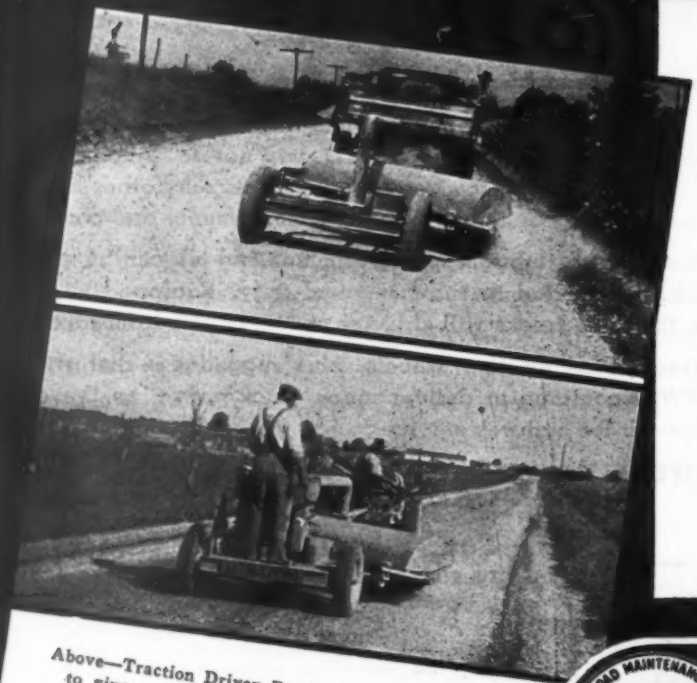
LITTLEFORD ROAD BROOMS





MODEL NO. 108
POWER DRIVEN BROOM

MODEL NO. 106
TRACTION DRIVEN BROOM



Above—Traction Driven Broom sweeping away dust to give perfect bond when Bitumen is applied.
Below—Power Driven Broom sweeping away loose dust before Bitumen is applied.

Before applying asphalt or tar to a road, use a Littleford Road Broom to sweep away the dust and dirt. Littleford Power or Traction Driven Brooms can be changed to sweep right or left—they're two way Brooms — can change from one sweeping position to the other in less than two minutes time. A hydraulic lift adjusts the tension of the Brooms on the sweeping surface. These modern Brooms are designed to do their share in building post war roads.

BLACK TOP ROAD MAINTENANCE EQUIPMENT
LB
SINCE · 1900

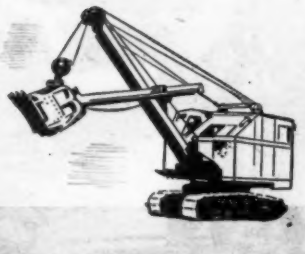
LITTLEFORD

LITTLEFORD BROS., INC.
454 E. Pearl St., Cincinnati 2, Ohio

No detail escapes the attention of Wellman's technical men. Here an engineer is studying photomicrographs to learn more about friction surfaces.

YOUR FRICTION PROBLEMS

are mighty important to us



Simple though it may seem, the friction in your clutches and brakes is extremely complex . . . influenced by pressure, temperature, velocity and many other factors. That's why The S. K. Wellman Company maintains a large and well equipped laboratory to study *your* friction problems.

From such research and experimentation have come many developments that result in smoother performing, longer lasting Velvetouch all-metal friction materials. Specify Velvetouch replacement clutch facings and brake linings for your tractors, graders, scrapers, shovels and other earthmoving equipment.

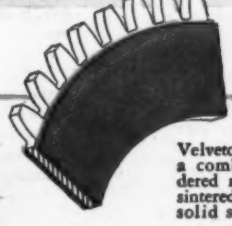
THE S. K. WELLMAN CO.
1374 EAST 51st STREET • CLEVELAND 3, OHIO

Interesting Facts About FRICTION

Friction, both in its total amount and its coefficient, is practically independent of the surface areas in contact, so long as the total pressure remains the same.

Thus, in the illustration, the 10 lb. block has the same coefficient of friction (*f*) in a horizontal position as it does in a vertical position. The amount of surface areas in contact has little or no effect on the friction coefficients. When the pressure becomes abnormally high, howeves, friction increases at a rapid rate until seizing occurs.

For Brake and Clutch . . . Use Velvetouch



Velvetouch is ***all metal***— a combination of powdered metals, compressed, sintered and welded to a solid steel backing plate.

"MEASURED AIR" PROVIDES

- MORE POWER
- LONGER LIFE
- LESS OPERATING COST
- MORE WORK DONE FASTER

Thor "AIR ECONOMY"

FIGURED IN YOUR POST-WAR EQUIPMENT PLANS WILL SAVE YOU TIME, CUT COSTS . . . GET TOMORROW'S JOBS STARTED FAST AND MOVING!

THOR SUMP PUMP

A governor-actuated valve that controls speed and capacity from idling through various capacities up to maximum provides this same feature of "air economy" in the Thor Sump Pump.

THOR PAVING BREAKERS

Thor Paving Breakers, light, medium and heavy duty models, are equipped with the same "measured air" type of short-travel tubular valve as Thor Rock Drills.

The Paving Breaker valve actuates a block type piston, powering it with exactly the quantity of air required for both the forward and return strokes . . . minimizes vibration . . . makes the machine easy to handle.

HOW Thor "MEASURED AIR" ECONOMY WORKS!

Short-travel valve action is the real secret behind Thor "measured air" economy.

The shorter the travel, the more *positive the action* of the valve in admitting to the tool only the required amount of air—in instantly sealing the inlet against excess air.

Short-travel action *reduces wear* on the valve, retains positive "measure" of air for a greatly extended period of service.

Short-travel valve action powers each stroke of the tool with the same quantity of air—providing *smooth, uniform operation.* Elimination of excess air keeps out of the channel the overload of power that staggers the stroke and causes vibration.

THOR ROCK DRILLS

Six light, medium and heavy duty models for all rock formations.

THOR DRIFTER ROCK DRILLS

One light, and one medium weight model, hand or power feed, for all hard rock drifting.

THOR STOPER ROCK DRILLS

One medium, and one heavy duty model for stoping under all drilling conditions.

THOR PAVING BREAKERS

Four light, medium and heavy duty models for all demolition work.

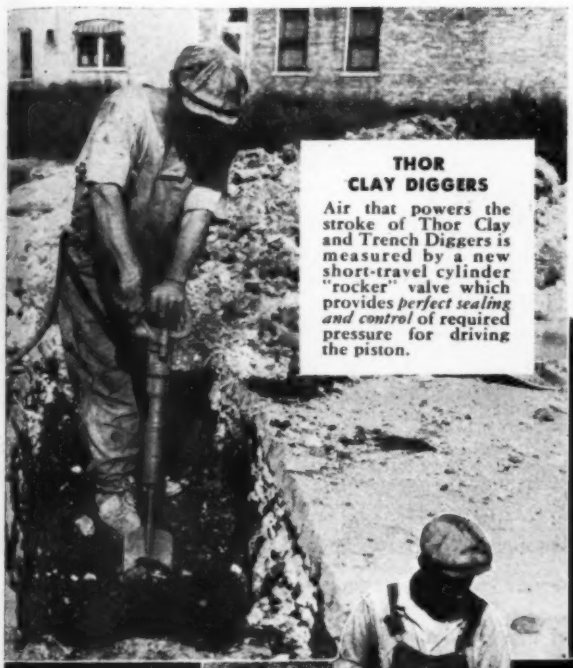
THOR CLAY AND TRENCH DIGGERS

One light, medium and heavy duty model of each for all tunnel and wall work.

WITH ALL THESE

Thor CONTRACTORS' AIR TOOLS!

The maximum power, balanced stroke and ease of handling provided by exclusive Thor *"measured air"* construction is available in every one of these Thor Contractors' Air Tools to save you time and operating costs on *all* construction jobs.



THOR CLAY DIGGERS

Air that powers the stroke of Thor Clay and Trench Diggers is measured by a new short-travel cylinder "rocker" valve which provides *perfect sealing and control* of required pressure for driving the piston.

THOR BACKFILL TAMPERS

A simple, efficient short-travel "rocker" valve powers the Thor Backfill Tamper with minimum air consumption, developing a balanced stroke that tamps for keeps."

THOR ROCK DRILLS

A short-travel tubular valve, heat-treated for durability and precision-ground for perfect fit, "measures" air that powers all three types of Thor Rock Drills—Sinkers, Drifters and Stopers.

Only the precisely-governed quantity of air required can enter any of these drills—controlled with .0002" between the valve flange and chest shoulders through which the air enters and returns.

This precise control of air consumption provides steady power and smoothness in the *automatic rotation* of these drills. *Controlled air* driving the piston gives the steel on the working end maximum forward and rotative action . . . assures fast drilling speed!

All these advantages of "air economy" are but part of the operating and money saving benefits you get with Thor Air Tools. For particulars about *automatic rotation . . . cushioned action . . . automatic lubrication . . . exclusive retainer design,* and many other Thor features, write today for Catalog No. 42-A.

THOR SUMP PUMPS

One current model, designed for all jobs under most unfavorable conditions.

THOR BACKFILL TAMPERS

One light and one heavy duty model for tamping clay and other stiff materials.

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities

Land Battle Wagon....

OFFICIAL U. S. NAVY PHOTO

Seabees and their International on a Tough Waterfront Job

THE SEABEES know International Trucks. They know that when the chips are down an International earns the call as a Land Battle Wagon. Here's a tough waterfront job . . . the 63rd Construction Battalion of the Seabees and an International at work.

International Trucks with the Seabees, like Internationals everywhere, are all-truck trucks. Every part and fitting is made for one purpose—stalwart truck performance. These trucks are brothers under the hood of the International Half-Tracks that are fighting on foreign fronts, powered with the same famous International Red Diamond Engines.

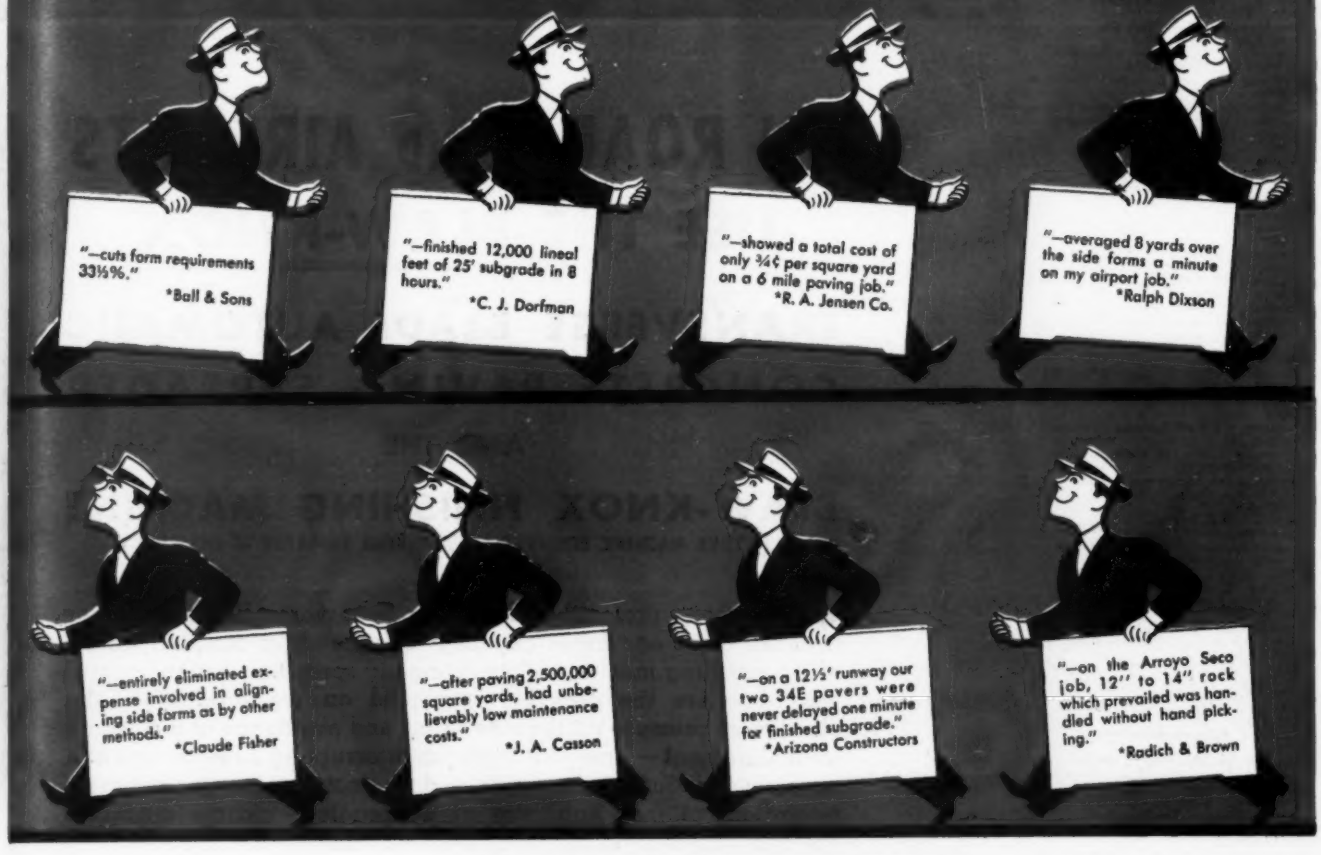
International Trucks are rugged. Their stamina and dependability at war and at home explain why—in the 10 years before the war—more heavy-duty International Trucks were sold than any other make.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL *Trucks* HARVESTER

New Trucks—Now! The government has authorized the manufacture of a limited quantity of trucks for essential civilian hauling. International is building them in medium-duty and heavy-duty sizes. See your International Dealer or Branch now and get valuable help in making out your application. Don't delay!

Contractors are our best salesmen!


"—cuts form requirements 33⅓%."
*Ball & Sons
"—finished 12,000 lineal feet of 25' subgrade in 8 hours."
*C. J. Dorfman
"—showed a total cost of only ¾¢ per square yard on a 6 mile paving job."
*R. A. Jensen Co.
"—averaged 8 yards over the side forms a minute on my airport job."
*Ralph Dixson
"—entirely eliminated expense involved in aligning side forms as by other methods."
*Claude Fisher
"—after paving 2,500,000 square yards, had unbelievably low maintenance costs."
*J. A. Casson
"—on a 12½' runway our two 34E pavers were never delayed one minute for finished subgrade."
*Arizona Constructors
"—on the Arroyo Seco job, 12" to 14" rock which prevailed was handled without hand picking."
*Radich & Brown

Every owner of a STANDARD - LEWIS subgrader says *unreservedly* that it excels in every way

Here are a few reasons why:

The Standard-Lewis subgrader is designed with a sectional stationary cutting blade (adjustable to any desired subgrade contour) on each side so that grading may be done in either direction without turning machine or time consuming "pull backs." It can be raised by power to pass over manholes, culverts and other obstructions, while in operation. Wheels may be turned 90° to permit towing by truck or tractor over bridges or through narrow places. Many other features make it the one subgrader designed to meet postwar requirements for better, faster paving.

GET THE WHOLE STORY— SEND FOR THIS BULLETIN

STANDARD STEEL CORPORATION

General Offices and Plant: 5001 South Boyle Avenue
Los Angeles 11, California

Distributors throughout the United States and Canada

***Space will not permit full addresses which will be sent on request.**

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San Francisco, Cal. — C. H. Grant Co.
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Barre, Vt. — Cassellini-Venable Corp.
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Philadelphia, Pa. — Giles & Ransome
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Buffalo — Trevor Corporation
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Endicott — Newing Motors Co., Inc.
New York — R. E. Brooks Company
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Syracuse — Syracuse Lumber Co.
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Cleveland — H. B. Fuller Equipment Co.
Columbus — W. W. Williams Co.
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. . . for High Speed

ON ROADS AND AIRPORTS
USE THE BLAW-KNOX

TRANSVERSE BLADE AUTOMATIC CONCRETE PAVING SPREADER

AND THE

BLAW-KNOX FINISHING MACHINE

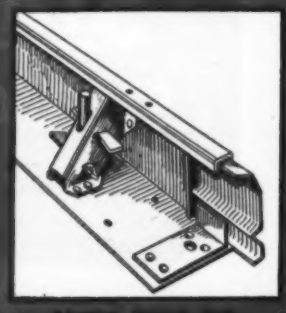
(EITHER MACHINE EQUIPPED WITH PAVING VIBRATOR IF DESIRED)

● Contractors prefer the Blaw-Knox Transverse Blade Spreader because of its enormous capacity for spreading concrete ahead of the finishing machine — its automatic spreading action regardless of where the concrete is placed on the subgrade — the absence of pressure on the side forms and avoidance of disturbing form alignment — freedom from job-interrupting breakdowns and excessive maintenance costs — does not segregate concrete regardless of maximum size of aggregate — narrow machines are convertible to wider machines and vice-versa.

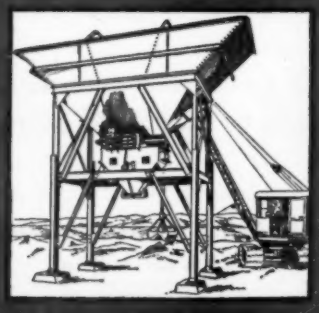
● Contractors also prefer the Blaw-Knox Finishing Machine because of the smooth finish obtained under maximum production conditions — wide screed ends prevent wastage of concrete over side forms — six traction speeds and four screed speeds for flexibility of operation to handle varying types of concrete — machine is easily and quickly adjustable for width — proper weight distribution makes machine easy on the side forms and easy to steer — low upkeep cost — easy to operate.

● The combination of the Blaw-Knox Finishing Machine and Transverse Blade Spreader has the capacity to handle the maximum output of two 34-E Dual Drum Pavers.

● See your nearest Blaw-Knox distributor about Blaw-Knox Finishing Machines and Blaw-Knox Transverse Blade Automatic Concrete Paving Spreaders for your next paving job.



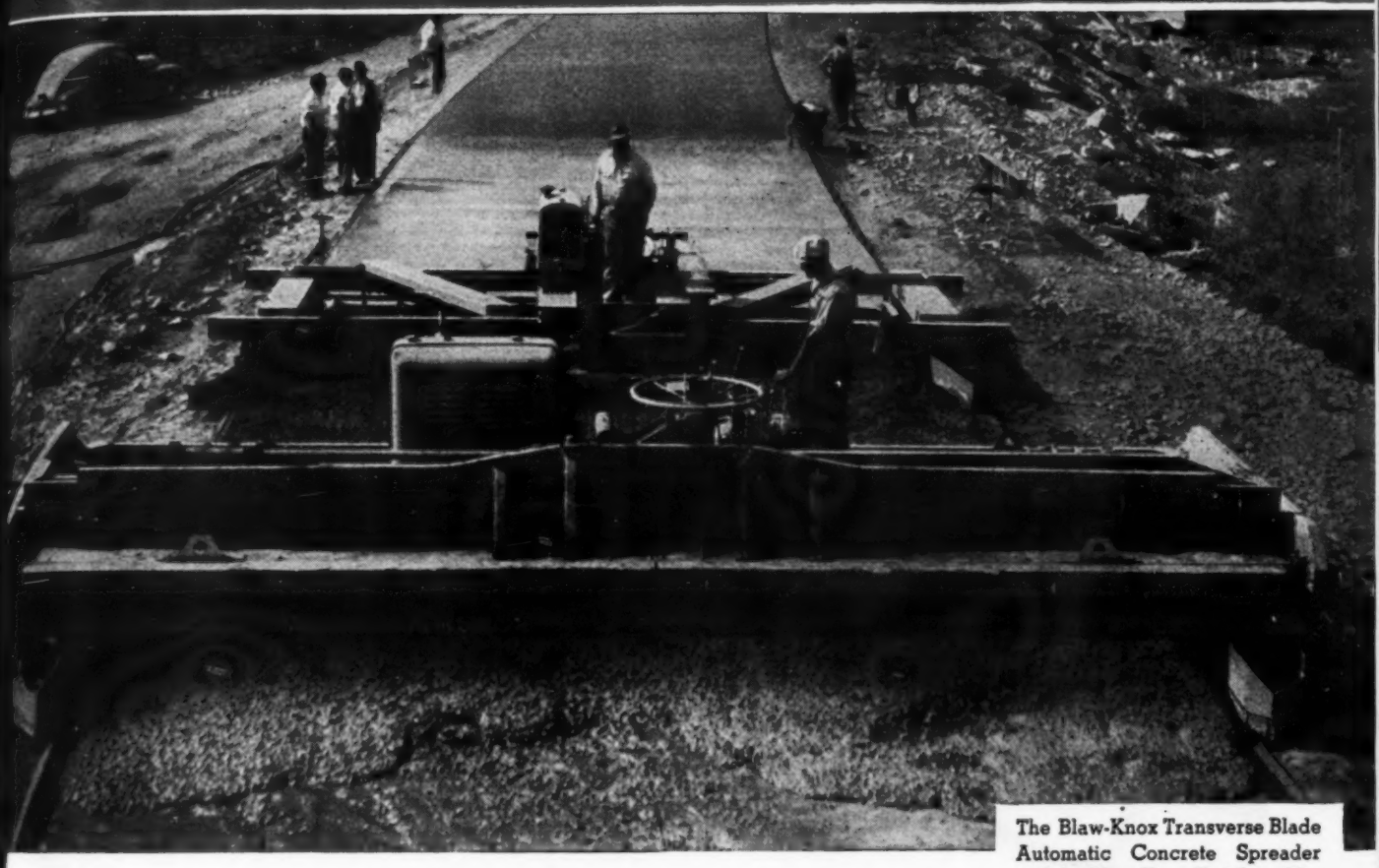
PAVING FORMS FOR AIRPORTS AND ROADS



AGGREGATE BATCHING PLANTS

CLAMSHELL BUCKETS

ed Quality Paving Production



The Blaw-Knox Transverse Blade Automatic Concrete Spreader and the Blaw-Knox Finishing Machine illustrated are paving the Queens Highway — the main east and west route in Ontario, Canada. The old pavement had disintegrated under heavy war traffic. Both machines are adjustable from 20 to 25 ft. widths. Photo shows paving operations on super elevated curve, 22 ft. width of slab.

- Pick for your job the machines that have made good on the world's toughest proving grounds, paving air bases and roads for the armed forces on every front.

- New points in design and construction, war inspired, will be found in the Blaw-Knox construction equipment you'll be using for post-war construction.

BLAW-KNOX

BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
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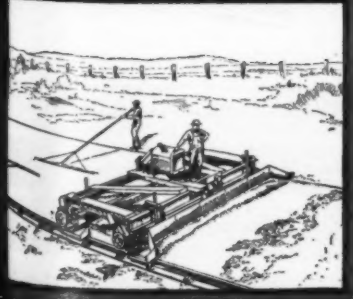
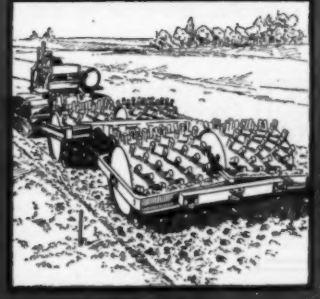
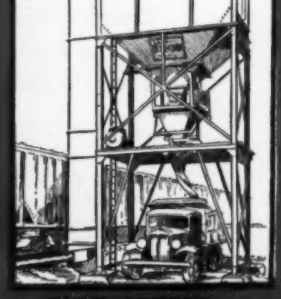


FINISHING MACHINES FOR AIRPORTS AND ROADS



SHEEPSFOOT TAMPING ROLLERS

CONCRETE BUCKETS



BULK CEMENT PLANTS

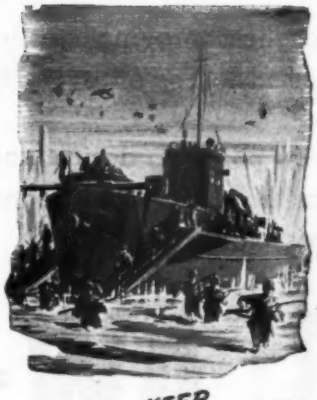
Engine
No. 100,000
Already on its way to join the other Detroit Diesel 6-cylinder engines serving in America's landing craft, tanks, trucks, bulldozers and other war equipment.

10 DIVISIONS OF FIGHTING ENGINES

MONTHS ago the Detroit Diesel Engine Division of General Motors sent engine No. 100,000 off the production line to its war job. Many more have followed since. Measured as men, more than ten divisions of these six-cylinder Diesels are actively in the fight. They're in landing craft helping to crack Fortress Europe and to cut the Nips' string of islands. They're in tanks, trucks, bulldozers and all kinds of other equipment. The reasons are, these Diesels are tough and dependable. They're easy to maintain. They burn inexpensive fuel oil.

They have been tried and proved in all sorts of war jobs on every battle front. And they've been found good.

With the coming of peace these engines will be available for all the applications where America will need reliable, low-cost power.



KEEP AMERICA STRONG
BUY MORE WAR BONDS

GM
GENERAL MOTORS
DIESEL POWER

ENGINES . . 15 to 250 H. P. . . DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.

ENGINES . . 150 to 2000 H. P. . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio

LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

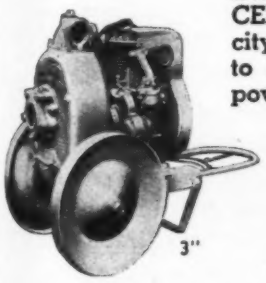
LOOK AHEAD WHEN YOU BUY

Guaranteed performance is *minimum* performance for JAEGER "Sure Prime" PUMPS

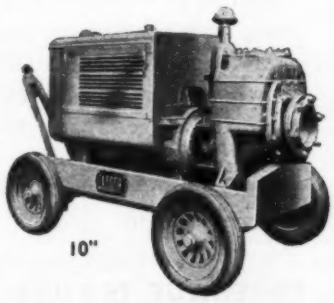
3000 Gallon "Bantam"

Contractors who watch their costs know there's a *big* difference between a Jaeger "Sure Prime" and an ordinary pump of the same size and rating. Jaeger Pumps are built to *exceed* their promises — deliver their rated capacity under tougher conditions, prime unfailingly and up to 5 times faster, assure you of thousands of *extra* hours of dependable cost-cutting service during the post-war building years ahead.

INDIVIDUALLY TESTED AND CERTIFIED for vacuum, capacity and pressure. Sizes 1½" to 10"; gas, electric or diesel power.



3"



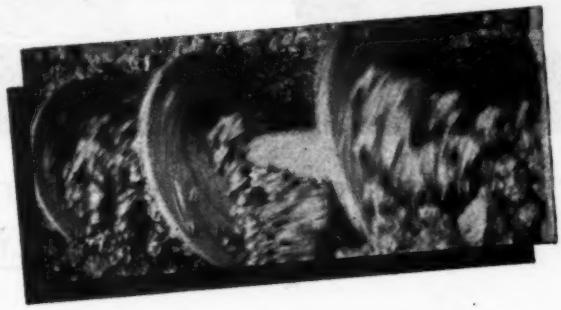
10"

JAEGER DISTRIBUTORS in over 100 cities sell, rent and service "Sure Prime" Pumps.

LOOK AHEAD WHEN YOU PLAN

Jaeger's method of RE-MIXING ON THE SUBGRADE will meet tomorrow's specifications...

— the Spreading Screw does it!



Comparative tests by highway engineers have proved conclusively that the Jaeger Screw Concrete Spreader produces a more uniform and denser pavement slab.

By its thoro, positive re-mixing and inter-mixing of piles dumped on the subgrade, both segregation in the batch and the variations between batches are eliminated; badly placed batches are re-distributed to leave a uniform spread ahead of the Finisher; material is placed so solidly against road base and side forms as to eliminate the honeycomb problem and the entire mass compacted to a weight and density approaching that of vibrated concrete.

It is logical to expect that re-mixing on the subgrade will be specified to insure higher strength, longer life pavements.

THE JAEGER MACHINE COMPANY
223 Dublin Avenue, Columbus 16, Ohio

JAEGER *Engineered* EQUIPMENT

"FLEET-FOOT" CRANE-LOADERS

"SPEEDLINE" MIXERS

"SURE-PRIME" PUMPS

"AIR-PLUS" COMPRESSORS

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

THE CARRYALL YOU'LL NEED *TOMORROW* CAN BE DESIGNED ESPECIALLY FOR YOU *TODAY!*

TODAY special Fruehauf Carryalls are being used to haul giant fighting tanks to the battle fronts and to retrieve them when damaged by enemy fire or mechanical difficulty.

Tomorrow the heavy-duty Trailers that are having their trial-by-fire now will be all the better suited to the requirements of your job. Many of the features of these war-time Fruehaufs have always been incorporated in our units. Many other features are the direct result of war's demands and military experience.

When you work with Fruehauf on your hauling problem, you find this: it is looked upon by our engineers as an *individual* problem. There is no need or inclination to adjust your requirements to our product—because it is just as easy, and far more satisfactory, to fit our product exactly to your requirements.

The Fruehauf you need may range in capacity from 10 to 100 tons . . . it may be either a semi or full-Trailer type . . . single or double-drop-frame . . . side or rear loading . . . may have four tires or up to twenty-four . . . with any one of a number of wheel and axle combinations . . . any width . . . any length . . . the applications to your special needs are endless.

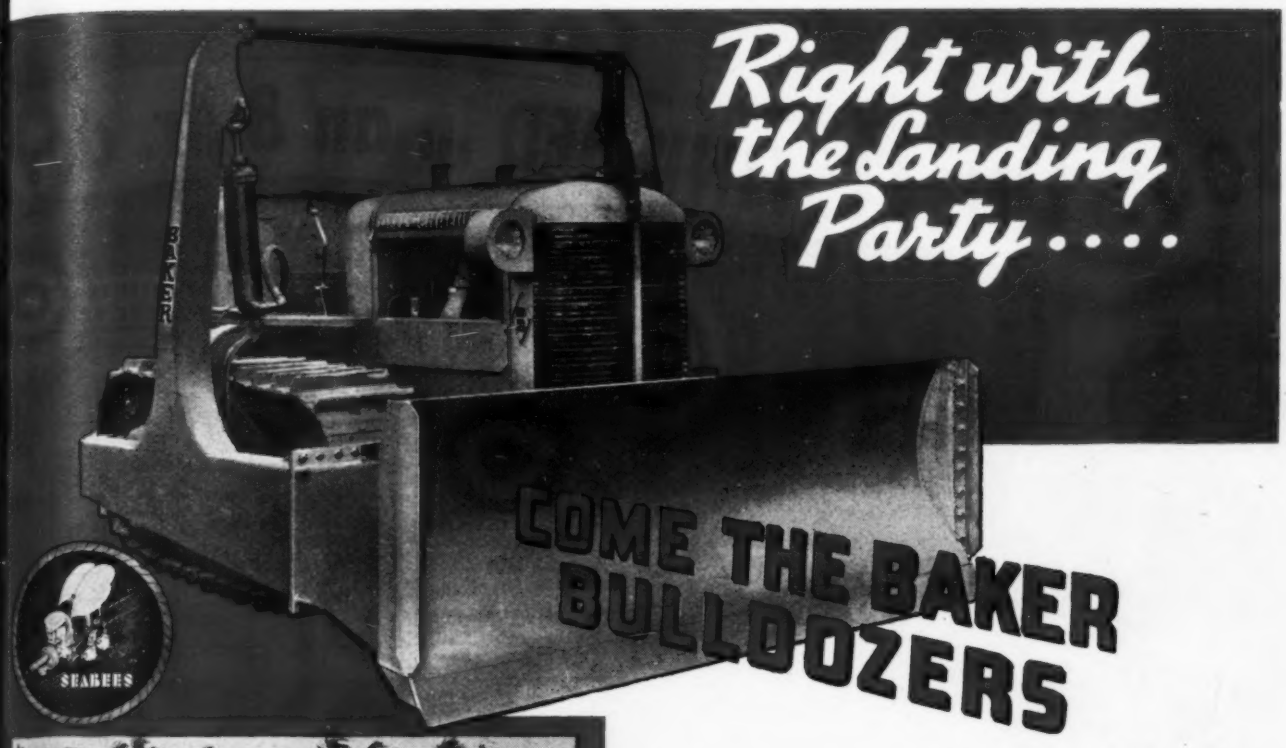
Today, of course, few Fruehauf Carryalls are being built for civilian use. But today is not too soon to consult with our engineers on getting your *postwar* Carryall designed and through the blueprint stage, ready for the production go-ahead. This costs you nothing extra and entails no obligation—but you will find that it saves you weeks in the long run.

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER CO. ◆ DETROIT

Service in Principal Cities

FRUEHAUF "Engineered Transportation" TRAILERS



Right with the Landing Party....

COME THE BAKER BULLDOZERS

Baker Bulldozer on Allis-Chalmers tractor spreading, leveling and compacting sand on jetty for unloading supply ships; South Pacific.

Baker spreads material for another type of jetty to facilitate landing of barges.

Bulldozers are not fighting equipment. They pack no artillery—they have no protecting armor plate. They don't even enjoy pet names like "Lulu Belle" or "Memphis Mamma," but they are in there—pitching!

Baker Bulldozers are doing all right backing up the Yanks in every theater of war. You will find them right behind the fighting men — filling shell holes—leveling cratered air fields—excavating for underground oil tanks and ammunition dumps—building landing docks—digging drains and foxholes—making themselves useful to the fighting men. Their aid in consolidating positions on beach heads, mountain sides or sand dunes is hard to over-estimate.

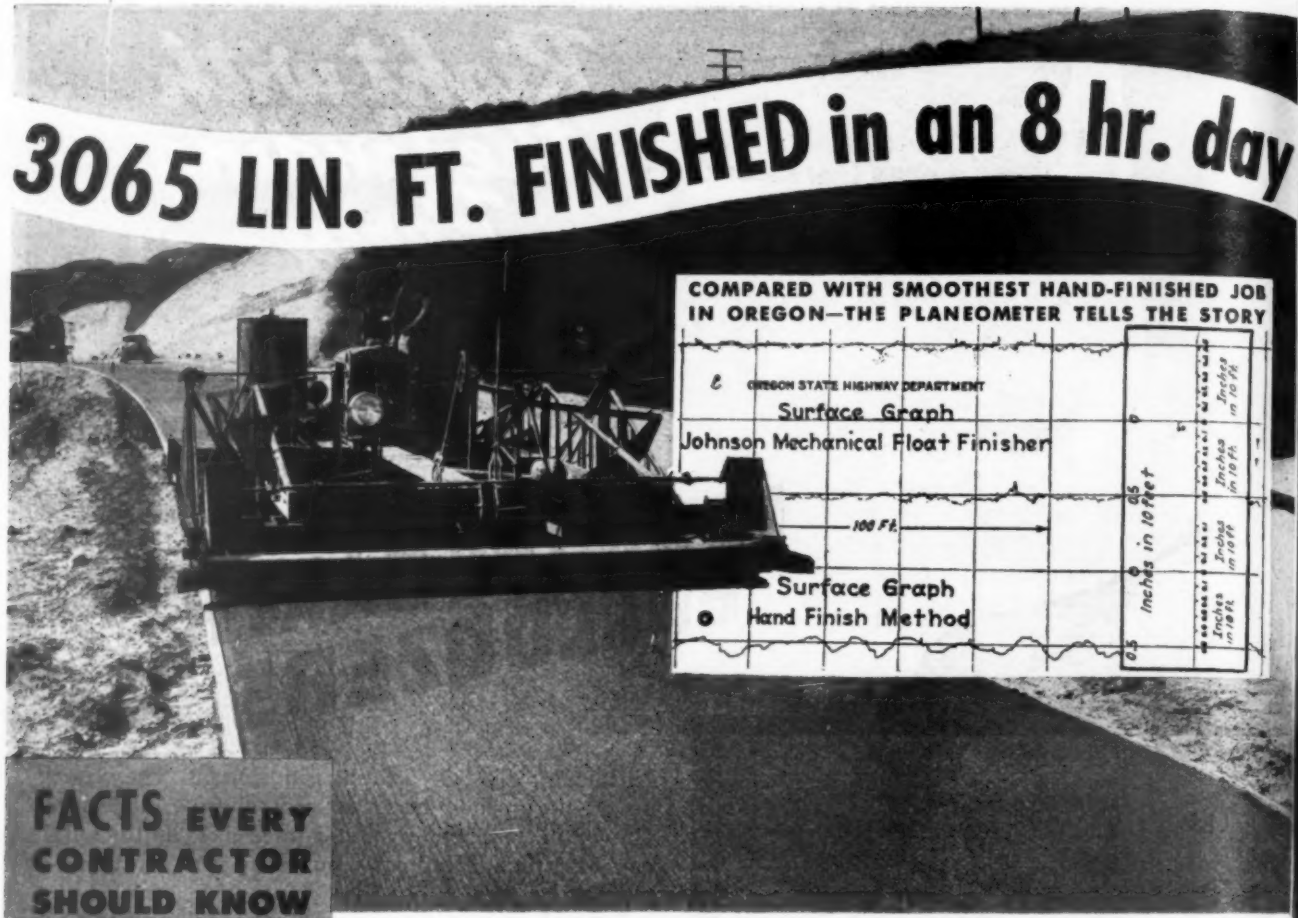
Commanders of task forces have learned that it is almost as important to have bulldozers as tanks in the holds of their LST ships. Bulldozers have won their spurs and Baker Bulldozers, because of their fast, positive hydraulic control, dependability and rugged design stand high on the honor roll.

It's true that supporting our fighting forces is a full time job for Baker Bulldozers *NOW*. But just as soon as our enemies are vanquished, you will find the Baker ready to perform equally notable feats on your contracts. Send for a copy of "Unsung Heroes of War."

THE BAKER MFG. CO.
506 Stanford Ave.
SPRINGFIELD, ILL.

BULLDOZERS SNOW PLOWS **BAKER** CONSTRUCTION EQUIPMENT

3065 LIN. FT. FINISHED in an 8 hr. day


COMPARED WITH SMOOTHEST HAND-FINISHED JOB IN OREGON—THE PLANEOMETER TELLS THE STORY
OREGON STATE HIGHWAY DEPARTMENT
Surface Graph
Johnson Mechanical Float Finisher
100 Ft.
Inches in 10 Feet
Surface Graph
Hand Finish Method

FACTS EVERY CONTRACTOR SHOULD KNOW

The Johnson Float Finisher is efficient on all modern vertical, horizontal and transverse spiral curves.

This finisher makes a smoother, more perfect road surface (see graph).

Has been in use in western states for 7 years.

Keeps up with the largest high-capacity mixers.

Maintains daily production speed—never grows tired.

Equipped with trailer hitch and wheels for short hauls.

Can be dismantled into legal truckload complying with highway regulations.

Write for Catalog

... finished with a Madsen-built JOHNSON FLOAT FINISHER

CONTRACTORS! You can increase the daily production of your paving crew . . . reduce finishing costs by 50% . . . and eliminate the bottleneck of hand float finishing with a Johnson Float Finisher. It reduces the finishing crew to two men for a complete job including edging and jointing on any paving project using a seven-sack paver.

When Roy Houck, Oregon paving contractor, placed 746 cu. yds. of concrete and finished 3065 lin. ft. of pavement in an 8-hour day (383 ft. per hr.), he set a record of production and the Johnson Finisher helped make it possible.

He did not set a record for finishing—the speed of the Johnson Float Finisher is far greater than required under present-day cement concrete production methods.

With the savings in labor and the increased production of the paving crew, the Johnson Float Finisher will pay for itself in 25 miles or less of double-strip highway.

Plan for tomorrow, today! Write for Catalog No. MP-140.

MADSEN IRON WORKS
HUNTINGTON PARK, CALIFORNIA

MADSEN ASPHALT PLANTS • ROAD PUGS • CEMENT FINISHERS • BATCHERS • COMPACTORS

Pat. No. 2,280,275—April 21, 1942

REMOVE THE DANGER FROM SNOW PLOWING

Find out how Keystone Snow Plow Lights are making snow plowing safe. Hundreds of highway officials have found the answer.

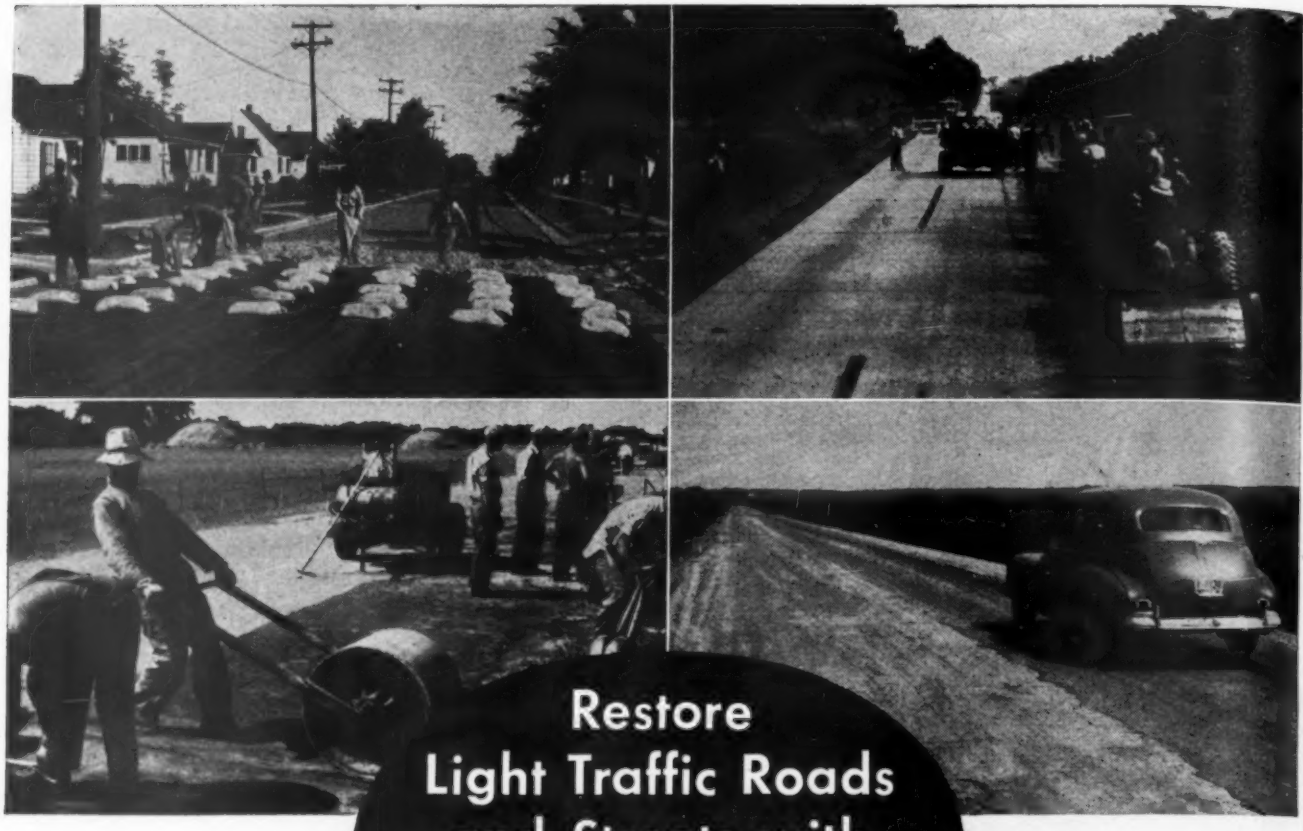
Put these strong, weatherproof, easy to see warnings on your equipment and stop accidents.

Immediate Delivery

AUTO GEAR & PARTS CO.

1410 W. HUNTING PARK AVE.

PHILADELPHIA 40, PA.



Restore Light Traffic Roads and Streets with SOIL-CEMENT

Spreading cement for salvaging old street in Wisconsin.

Putting finishing touches to newly compacted soil-cement patch which soon will carry traffic.

Mixing soil and cement on shoulder widening project in South Carolina.

Right half of old gravel road in Nebraska salvaged by soil-cement process.

Soil-cement is meeting the requirements of rigid economy essential to wartime salvaging, maintenance or widening of old roads and streets carrying light traffic.

Rundown sections of secondary or intermediate highways and streets needed for wartime traffic can be salvaged and restored to usefulness by processing the failed areas with soil-cement, using available maintenance machinery.

Light traffic roads which are now dangerously narrow can easily be widened with soil-cement shoulders.

Patch maintenance too is simple with soil-cement. Patches made with soil-cement "stay put."

Four-page illustrated data sheet (No. SCB-6) based on field experience will be mailed free to aid engineers in wartime salvaging and maintenance operations with soil-cement.

PORTLAND CEMENT ASSOCIATION, Dept. 9-28, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

BUY MORE WAR BONDS

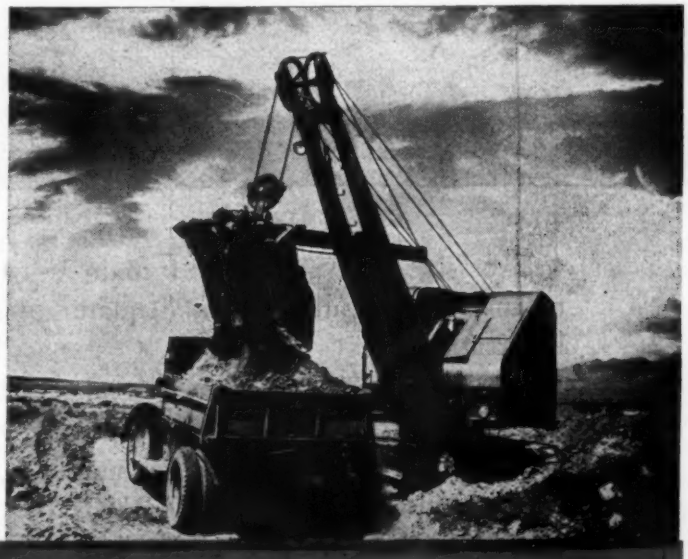
Signal Corps Photo

AN UNBEATABLE COMBINATION

This war has proved in a thousand ways the importance of teamwork; teamwork between army, navy and industry, between navy and air force, between artillery and infantry, between a soldier and his gun. Good men with poor equipment haven't been able to stand up to inferior men with better equipment. Good men *and* good equipment are unbeatable . . . on the fighting fronts, on the air bases, in the shipyards, in the quarries, in the metal mines, in the coal mines.

Experience and reputation in designing and building outstanding excavating equipment led to the selection of Bucyrus-Erie to work with the Army on the design and manufacture of the new 240-mm. howitzer, now in action. We're proud of that selection and of the phenomenal accuracy this weapon is demonstrating in battle. The same factors that make this largest U. S. mobile gun a leader, make your Bucyrus-Erie excavators "years ahead." In this war, all over the world, Bucyrus-Erie excavators, in the hands of good men, are shattering old production records. Post-war Bucyrus-Eries in the hands of your men will be an unbeatable combination.

V-61 C

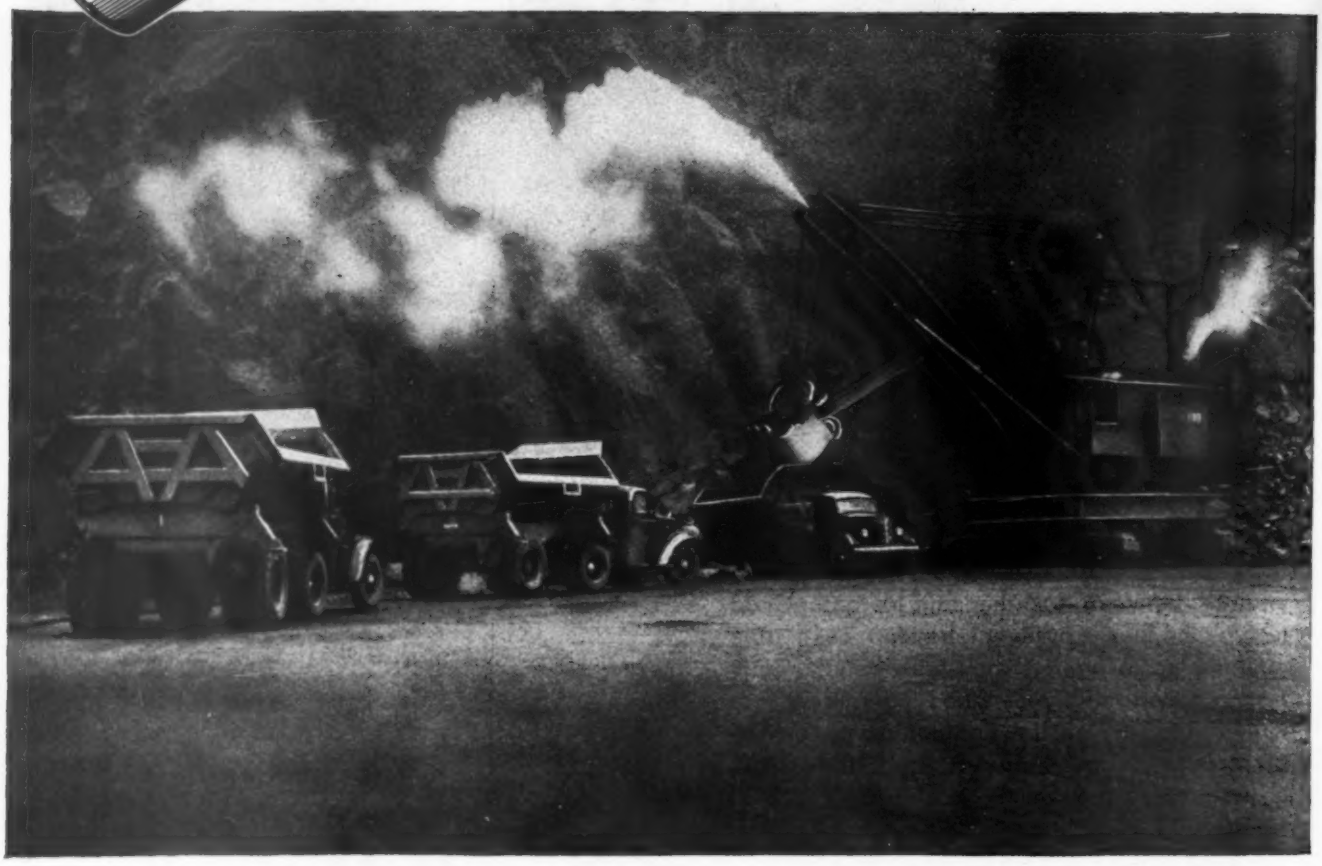


ARMY NAVY E

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

Better LUBRICATION MEANS *Better Maintenance*



• Excessive wear and difficult maintenance often result from inadequate lubrication.

Sinclair provides highly specialized Motor Oils, Gear Oils and Greases for *better lubrication* and better maintenance of *CONSTRUCTION EQUIPMENT* under continuous heavy duty operation. Sinclair Ten-ol 200 has been specially developed for proper lubrication of Diesel engines, and Diesel-powered shovels, buckets, and bulldozers.

• • •

(Write for "The Service Factor" — published periodically and devoted to the solution of lubricating problems.)

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

PLAN NOW TO REPLACE

Obsolete Equipment

WITH THE FASTER POWER OF TOURNAPULLS

YOU'LL GET MORE POWER FOR DIRTMOVING . . . LUG LESS DEADWEIGHT . . . WORK FASTER

movers with years of experience on actual earthmoving jobs. They know that speed and stoutness pay. You get both in Tournapulls.

Tournapulls move more dirt . . . move it faster and cheaper . . . because their working weight compared to power and capacity is much less than slower, track-type outfits—

Prime Mover and Equipment	Super C Tournapull & 15-Yd. Carryall	Tractor & 15-Yd. Scraper Approx.
Weight of Combined Units	31,000 #	53,500 #
Lbs. of Weight per Horsepower	207	411

Note that this difference in weight is the equivalent of 7.5 pay yards. Can you afford to lug that much deadweight back and forth on a 10,000-hour working life when you could be moving pay dirt with a Tournapull?

BIG TIRES REDUCE MAINTENANCE

Note, too, that the Tournapull has 150 brake horsepower for its working weight of 31,000—plus the flotation of big drive tires (21 x 24). These large tires give you plenty of traction with a minimum of wearing parts . . . also cushion the equipment against shock and reduce operator fatigue.

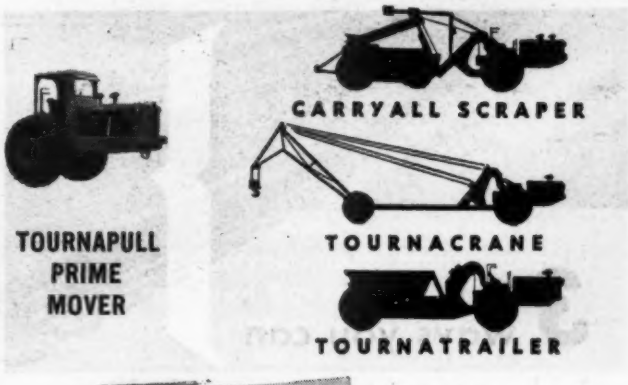
NO CHANGE IN OPERATING METHODS

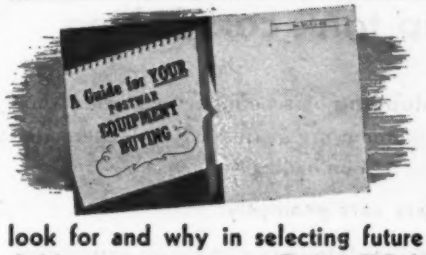
With Tournapulls you use the same time-tested LeTourneau operating methods that have proved so successful with tractor-scraper outfits—downhill loading, pushers for big-capacity scrapers, working cuts and fills in series, etc. But Tournapull speed enables you to complete round trips in ⅓ to ½ the time.

Why use slow-moving, overweight equipment, when you can have faster-moving, job-proved Tournapulls? You'll pay less, move more yardage . . . more profitably. Plan NOW to replace obsolete equipment with faster powered Tournapulls.

Only *TOURNAPULLS* Give You This Interchangeability

Cable control, with the job-proved LeTourneau Power Control Unit, makes possible these cost-cutting combinations—all with the same Tournapull prime mover.





Write today for this "Postwar Equipment Folder". Tells what to look for and why in selecting future construction units. Address your request to Dept. RS-944, R. G. LeTourneau, Inc., Peoria, Ill.

LETOURNEAU TOURNAPULLS

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

JOB-PROVED 2000 Built and Shipped

Manufacturers of TOURNAPULLS*, DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TOURNACRANES*.

*Trade Mark Reg. U. S. Pat. Off.

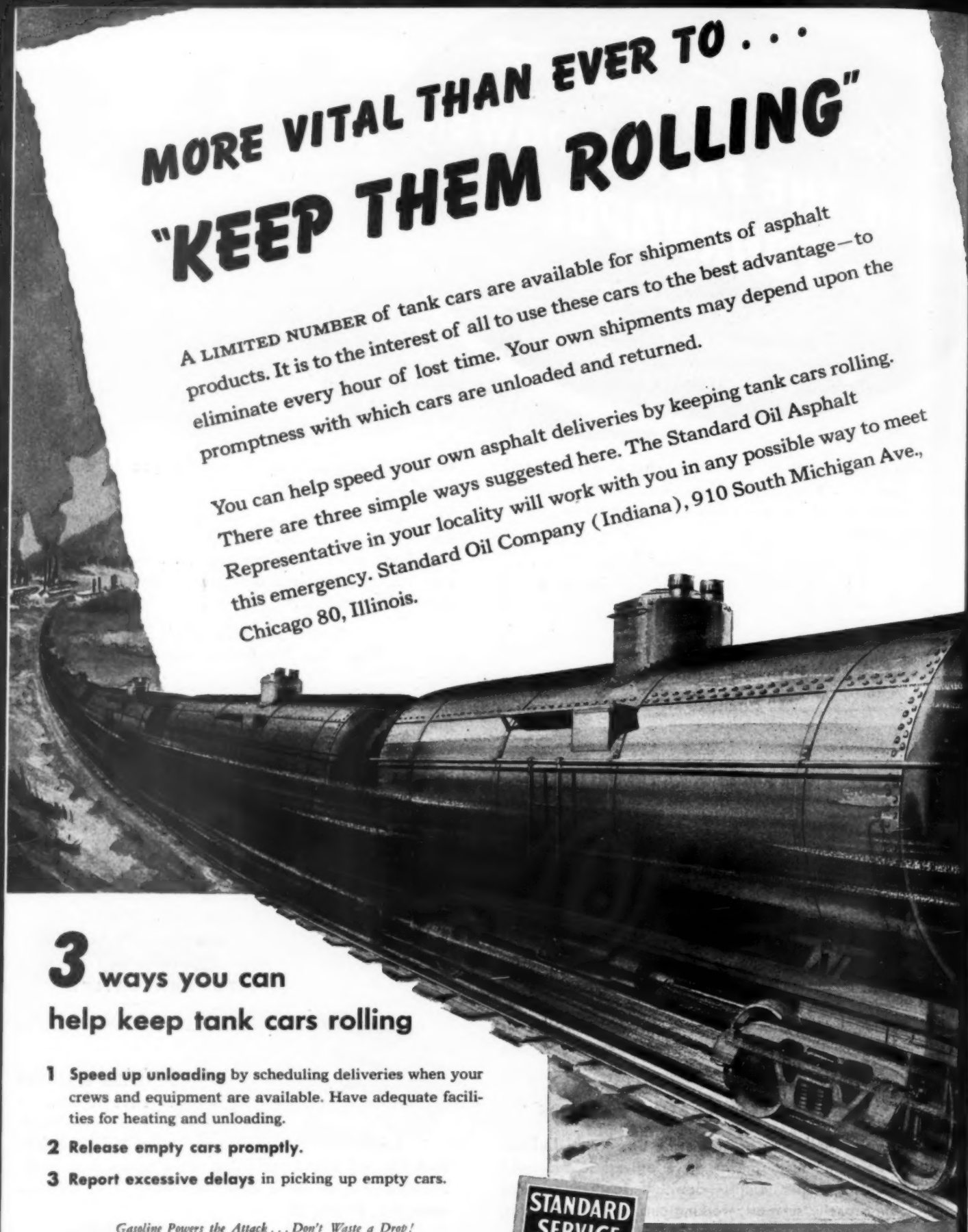
RUBBER-TIRED POWER FOR FASTER EARTHMOVING

MORE VITAL THAN EVER TO . . .

"KEEP THEM ROLLING"

A LIMITED NUMBER of tank cars are available for shipments of asphalt products. It is to the interest of all to use these cars to the best advantage—to eliminate every hour of lost time. Your own shipments may depend upon the promptness with which cars are unloaded and returned.

You can help speed your own asphalt deliveries by keeping tank cars rolling. There are three simple ways suggested here. The Standard Oil Asphalt Representative in your locality will work with you in any possible way to meet this emergency. Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.



3 ways you can help keep tank cars rolling

1 **Speed up unloading** by scheduling deliveries when your crews and equipment are available. Have adequate facilities for heating and unloading.

2 **Release empty cars promptly.**

3 **Report excessive delays** in picking up empty cars.

Gasoline Powers the Attack . . . Don't Waste a Drop!

STANDARD SERVICE

ASPHALT FOR EVERY PURPOSE

STANDARD OIL COMPANY (INDIANA)

Save the Surface with Proper Drainage

In postwar highway and airport construction planning, much thought is being given to proper drainage. Too many hard-surfaced roads and airfields of the past decade "cracked up" prematurely because of inadequate provision for disposal of storm water.

Exhaustive studies and tests made by the Portland Cement Association, the Clay Products Association, the Armco Culvert Manufacturers Association and other researchers have proved conclusively the need for thorough drainage. The wealth of authoritative information available assures future roads and landing fields of maximum permanence.

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

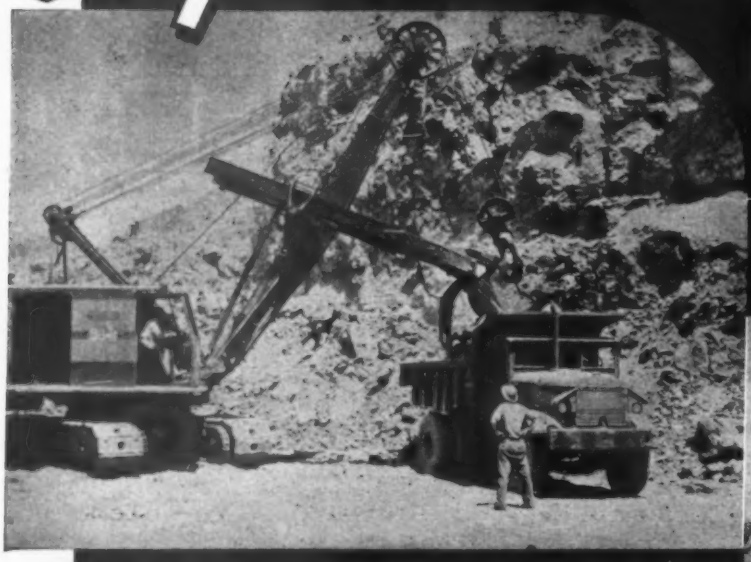
For over 50 years Buckeye Trenchers have provided trenching with maximum overall economy

Over a dozen models—ladder and digging wheel types—in the broad soundly engineered Buckeye line. Service trenchers for general application, specialized models for airport and farm drainage, pipeline and utility work. When you think of trenching, you naturally think of Buckeye.

Buckeye Clippers
CONVERTIBLE SHOVEL—CRANE—TRENCH HOE

with exclusive MEVAC METERED VACUUM POWER CONTROL

Dependable EUCLIDS COST LESS TO OWN



On scores of big earth and rock moving jobs, and in industrial operations too, Rear-Dump and Bottom-Dump EUCLIDS are moving more yards and tons per hour at consistently lower cost. Carrying pay loads of 15 to 30 tons at speeds up to 33 m.p.h., EUCLIDS cut down the round trip time from the loading unit to dump and carry more pay loads per hour.

Designed and built throughout for the hard service of off-the-highway hauling, EUCLIDS actually cost less to own than ordinary hauling equipment. Lower operating and maintenance cost, plus dependable trouble-free operation, has made Euclid the favorite equipment of contractors and industrial users for hauling all kinds of heavy excavation and materials.

If you need new equipment for a current job or are planning for your peace time requirements, be sure to consult your Euclid distributor or write us for descriptive literature.

The EUCLID ROAD MACHINERY Co.
Cleveland 17, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH ROCK COAL ORE

Haul More in '44

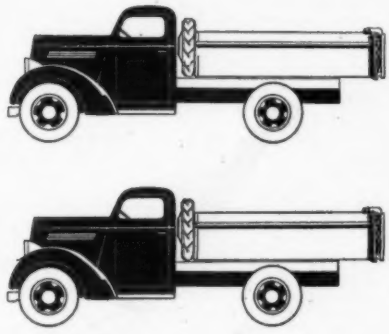
THE THORNTON WAY

MAKE YOUR 1½-2 Ton MEDIUM TRUCK DO WORK OF TWO!

FLASH: WPB HAS NOW REMOVED ALL RATIONING RESTRICTIONS FROM THIRD AXLE CONVERSIONS

THIS

1 Heavy Duty Truck
1 Driver (does work of two)
1 Wage



NOT THIS

2 Medium Trucks
2 Drivers
2 Wages

THORNTON GIVES 100% MORE TRACTIVE EFFORT...100% MORE PAYLOAD CAPACITY

Whether your business is mining, logging, lumbering, oil production, hauling, construction work, etc., you face the need of more heavy duty trucks. *Where* can you get them? *Here is the solution:* If you own a new or used 1½-2 ton medium, we can convert it into a rugged, powerful, 6-wheel heavy duty truck capable of hauling 100% *more* payload through dirt, sand, mud, snow and up steeper grades.

We can prove savings in manpower . . . investment . . . operation . . . upkeep.

You need this heavy duty conversion. Place your order with Thornton today. Make more money with one truck.

This is the Thornton Drive, consisting of two driving axles, two-speed gear case assembly, "walking beam" type springs; wheels; tires.

THORNTON TANDEM CO.
8725-D GRINNELL AVENUE • Plaza 9700
DETROIT 13, MICHIGAN, U.S.A.

Investigate THORNTON *Automatic-Locking* DIFFERENTIAL for Replacement in Truck Axles

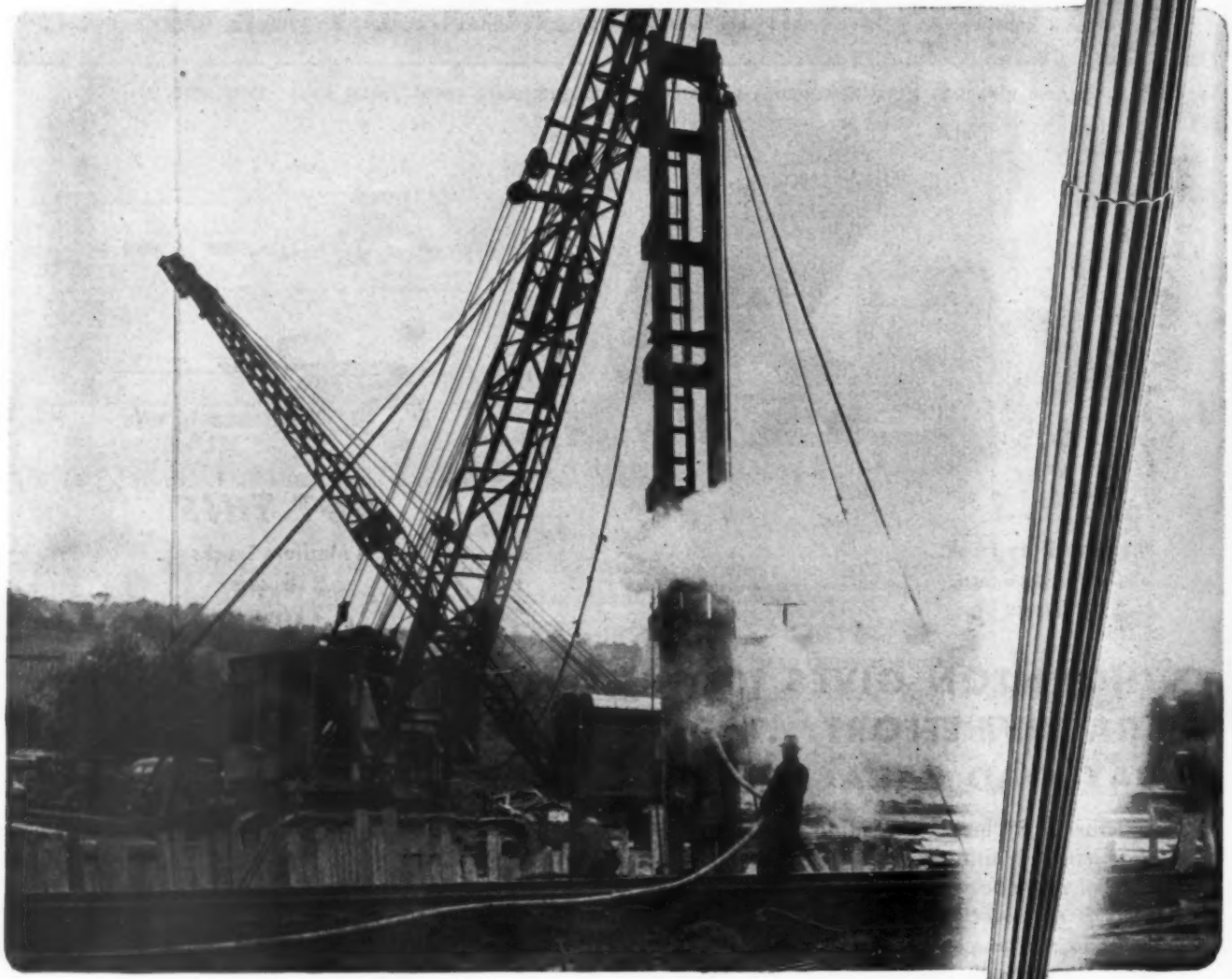
In U. S.: Sold by Truckstell Distributors

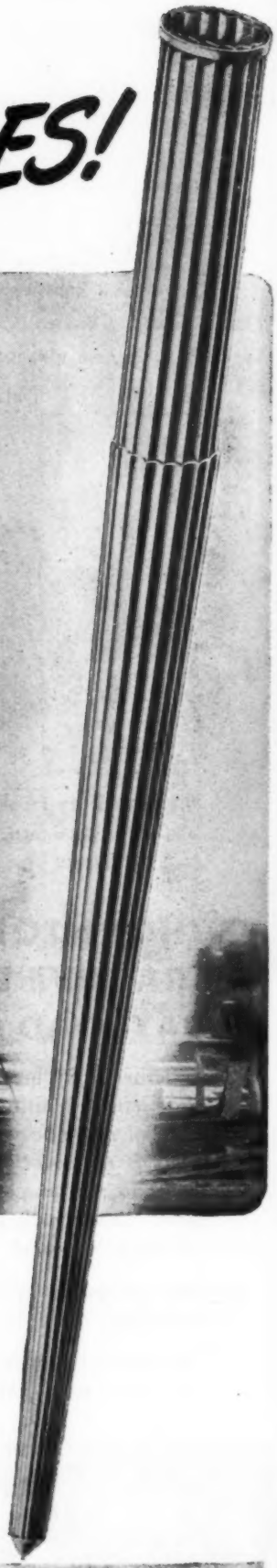
Thornton Tandem Co.
8725-D Grinnell Avenue
Detroit 13, Michigan, U.S.A.

Please send me catalog of facts on changing my 1½-2 ton truck into a heavy duty truck.

Name_____
Address_____
City_____ **State**_____
Make of Truck_____ **Year**_____
Used for_____

You can do it Better ...with MONOTUBES!





And here's why: Their tapered, fluted construction makes possible *speed with safety;* their tubular design means that you can *inspect them quickly,* top to toe, after they're driven to required bearing; extensions permit the fast, economical *installation of varying pile lengths* even in low headroom; and their light weight, despite their remarkable strength, allows you to *drive them with average job equipment.* Gauges, sizes, and tapers to meet all requirements. Write for your copy of Catalog 68A to the Union Metal Manufacturing Co., Canton 5, Ohio.

UNION METAL

Monotube Tapered Piles

AMERICA IS

Built with Aggregate!

Cedarapids

Built by IOWA

THIS is the home of national champions. They earned their title because of superior performance, teamwork, and the will to win.

Building a strong, safe, and permanent stadium like this requires similar qualities. The cooperation and spirit are American free enterprise which developed the equipment for producing huge quantities of low cost aggregates able to meet strict specifications. Such aggregate is produced by Cedarapids crushing equipment which has been constantly improved to provide the utmost in quality of products, low cost, and volume of production.

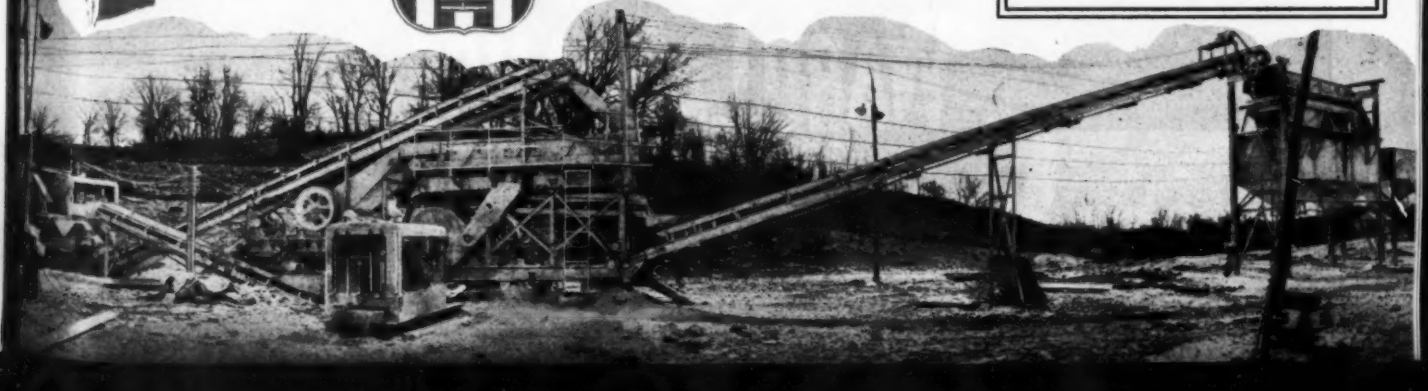
When you are figuring peacetime contracts for highways, airports or other engineering construction, that have made America strong, base your estimate on aggregate produced by Cedarapids equipment. Even though a large part of Iowa's production is still going to war you can always get more Cedarapids equipment for essential civilian use. Let us help you with the necessary releases and priorities. Come to Iowa, first, the home of Cedarapids aggregate producing and crushing equipment.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA

THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS — TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

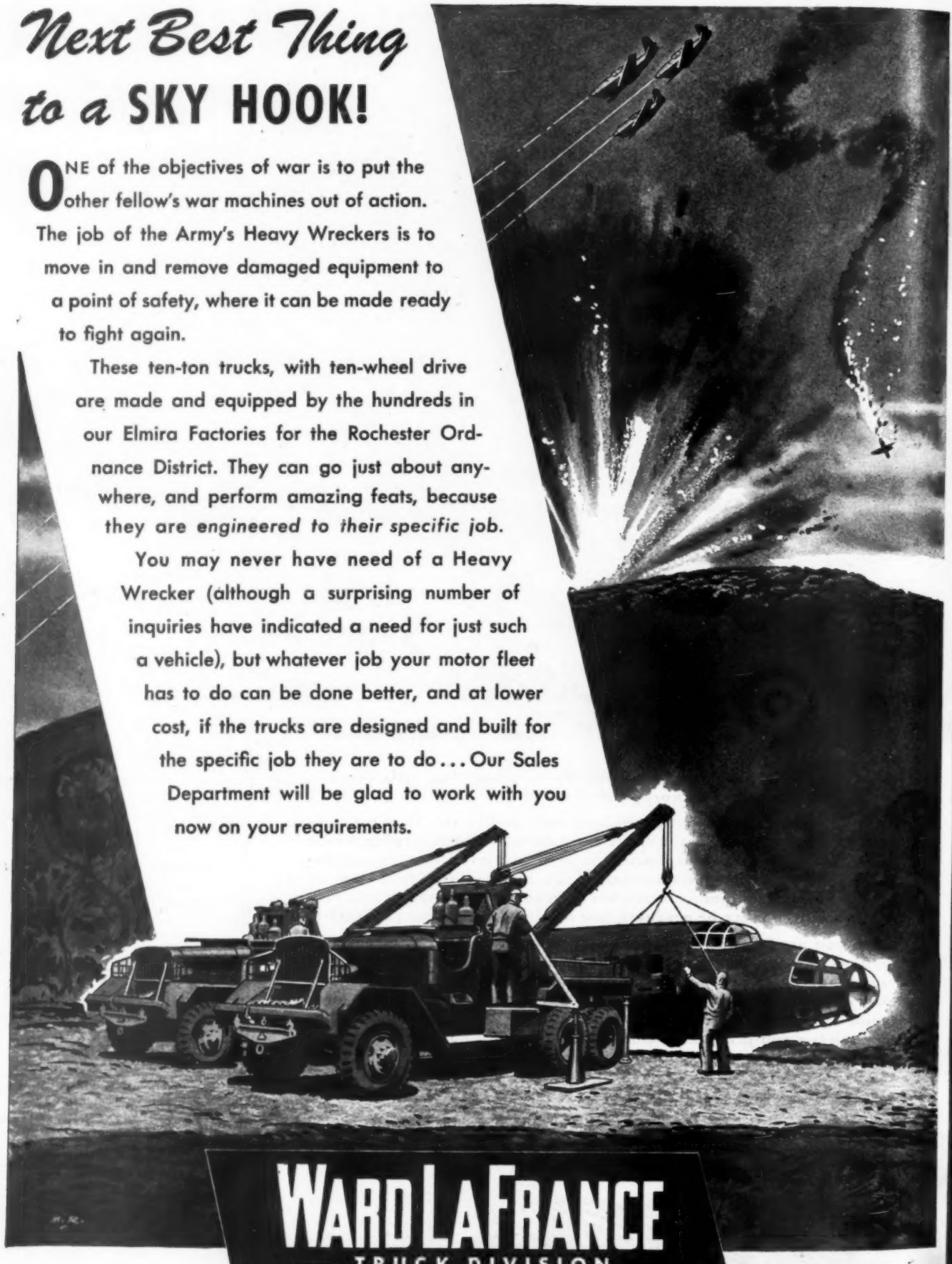


Next Best Thing to a SKY HOOK!

ONE of the objectives of war is to put the other fellow's war machines out of action. The job of the Army's Heavy Wreckers is to move in and remove damaged equipment to a point of safety, where it can be made ready to fight again.

These ten-ton trucks, with ten-wheel drive are made and equipped by the hundreds in our Elmira Factories for the Rochester Ordnance District. They can go just about anywhere, and perform amazing feats, because they are *engineered to their specific job.*

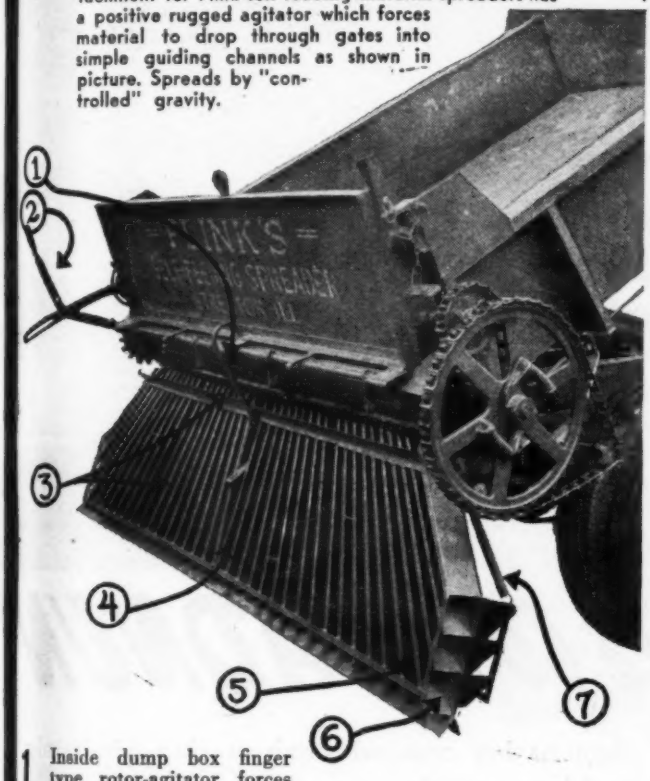
You may never have need of a Heavy Wrecker (although a surprising number of inquiries have indicated a need for just such a vehicle), but whatever job your motor fleet has to do can be done better, and at lower cost, if the trucks are designed and built for the specific job they are to do... Our Sales Department will be glad to work with you now on your requirements.



WARD LaFRANCE
TRUCK DIVISION
GREAT AMERICAN INDUSTRIES, INC.
ELMIRA NEW YORK

HOW FLINK NEW *Sand-Chip* SPREADER DOES BETTER JOB

Spreads an even layer of material faster. Keeps a perfect edge! The Flink "Sand-Chip" spreader attachment for Flink self-feeding material spreaders has a positive rugged agitator which forces material to drop through gates into simple guiding channels as shown in picture. Spreads by "controlled" gravity.



1. Inside dump box finger type rotor-agitator forces wet or dry materials through feed gates, into chute-like channels.

2. This lever accurately regulates amount of material passing through gates. Assures perfect control of amount spread, from thinnest surfacing to thick layers.

3. Material falls by gravity thru chutes which carry it to within a few inches of surface being spread. Compensating lever holds attachment in parallel position.

4. The spreader is divided at this point. Either half, or entire spreader can be removed in just a few seconds by one man. Special gate controls are obtainable for half-width or narrower spreading.

5. Each channel lays down the same quantity of material.

6. Exclusive "fold" feature. When not in use corners of Flink "sand-chip" spreader fold back so it will not be wider than the truck. This is a very simple, sturdy feature, one of the highlights of the spreader.

7. A strong spring holds the folded part back out of way when spreader is not in operation and also serves to hold it firmly when in operating position.

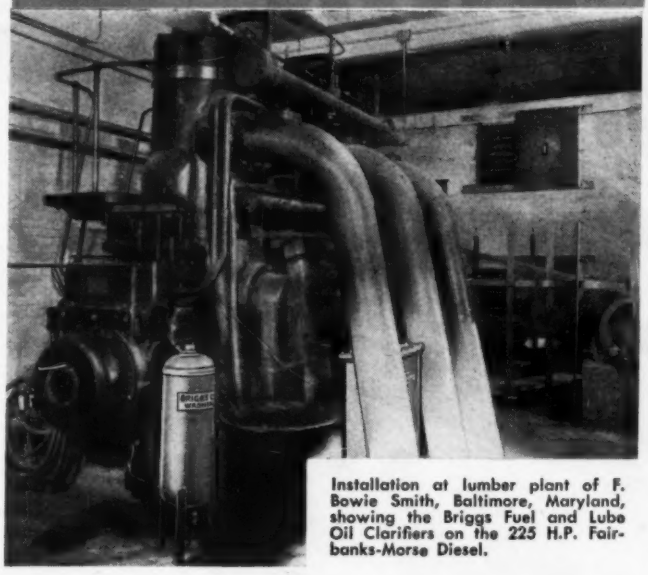
The FLINK COMPANY

508 VERMILION, STREATOR, ILLINOIS

AFTER 11,000 OPERATING HOURS

BRIGGS REFILL CARTRIDGES

STILL PROVIDE ADEQUATE OIL MAINTENANCE



Installation at lumber plant of F. Bowie Smith, Baltimore, Maryland, showing the Briggs Fuel and Lube Oil Clarifiers on the 225 H.P. Fairbanks-Morse Diesel.

Help Reduce Cost Of Generating Current For Large Lumber Mill

"The Briggs Fuel and Lube Oil Clarifiers on our Fairbanks-Morse Diesel that drives our 180 KVA generator showed us that maintaining oil in good condition paid off . . . by lowering oil consumption and reducing wear on our engine. We were so impressed that we installed Briggs Clarifiers on our trucks and personal automobiles," says Mr. F. Bowie Smith.

The history of this Briggs installation will impress anyone interested in facts about performance of oil maintenance equipment. Operates 49½ hours per week . . . has been operating for 4½ years . . . first set of refill cartridges lasted nearly 2 years . . . still operating on second set . . . no major repairs to engine even though it is run at considerable overload for extended periods.

Interested in what Briggs Oil Clarifiers can do for your Diesel-powered generating or mobile equipment? See the Briggs distributor nearest you.

Briggs

PIONEERS IN MODERN OIL FILTRATION

BRIGGS CLARIFIER COMPANY

GENERAL OFFICES, WASHINGTON 7, D. C.

DISTRIBUTORS IN PRINCIPAL CITIES

THICK or THIN —HOT or COLD

It's all the same to an ADNUN

You can lay any mix—hot or cold—any thickness —any width—with an Adnun Black Top Paver. It's exclusive method of Continuous Course Correction automatically assures more accurate distribution and depth of material as well as smooth finished surface. The Power Cut-Off, with hydraulically controlled gates provides positive control of the flow of materials and prevents grade inequalities. Overlapping action at the Cutter Bar produces a tight joint at the curb or against the paralleled courses. Hydraulic controls mean fatigueless operation.

Adnuns lay crushed stone or slag accurately and fast in single courses as deep as 6" or better or sheet ashphalt only a fraction of an inch thick. Black top paving laid by Adnuns is noted for maximum density, tight joints between strips, smoothest finished surface, and all-weather durability. Adnun Black Top Pavers were first in the field and still lead in performance. Write today for literature.

THE FOOTE CO., INC., Nunda, New York

The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers

ARMY E NAVY

ADNUN

TRADE MARK REGISTERED

BLACK TOP PAVER

WITH CONTINUOUS COURSE CORRECTION

Their business is to help keep your business going

◀ *Big, well-equipped service shops enable "Caterpillar" dealers to offer their customers the last word in maintenance and repair service.*

In this dealer's repair shop, every kind of "Caterpillar" equipment receives the attention it needs in the hands of skilled mechanics. ▼

DO YOU HAVE "IDLE" EQUIPMENT? The War Production Board wants to locate usable track-type tractors, motor graders, cranes, shovels—vitally needed by mining, logging, oil-field, agriculture and other industries. What can you spare—to rent or sell? If you don't know where to contact your regional WPB officials, your "Caterpillar" dealer will gladly direct you and give you further details.

"CATERPILLAR" owners are fortunate in having a dependable service-dealer organization to which they can turn for expert inspection, adjustments and repair work at a time when obtaining new equipment is virtually out of the question—except for the most essential needs.

That your "Caterpillar" dealer is able to provide such services, despite the fact that his showrooms may be empty, is due to sensible long-range planning. His dealership has been established on the sound principle that doing business successfully is not alone a matter of making sales, but of *keeping sold equipment in good operating condition—come what may.*

During the long war years, your "Caterpillar" dealer has been steadily on the job—geared to come through for you. In fact, his shop is likely better equipped to serve you than ever before, with more factory-trained service men, finer equipment and the latest methods to save time, money and war-critical materials in keeping your machines at work. His desire now, as always, is to make your business more profitable and he is equipped to make that wish come true.

Have your "Caterpillar" service-dealer go over your equipment now—for inspection, adjustments, and replacement or repair of worn parts. In this way, not only can your operating costs be kept at a minimum, but the life of the equipment can, most likely, be prolonged by thousands of hours.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

THE "FIGHTING FOUR"

INSPECT Look your equipment over frequently. For expert "internal" inspection of operating parts or functions, call in a trained "Caterpillar" service man. Read your Operator's Instruction Book.

LUBRICATE Use the right oil at the right time in the right place and in the right quantity. Keep the oil clean—change before it becomes dirty and deteriorated. Follow the Operator's Instruction Book.

ADJUST Tighten all bolts. Keep fan belt and tracks at proper tension. Read the Operator's Instruction Book. For fuel injection valves and other precision adjustments, let your experienced service-dealer do the work.

REPLACE Have your service-dealer replace or repair worn bearings, track rollers, pins and bushings, sprockets, cylinder liners, clutch linings. His service helps restore power and extend equipment life. Saves critical materials, too.

DEPENDABLE is the word for "Caterpillar" dealers

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

TRACTORS • ENGINES AND ELECTRIC SETS • EARTHMOVING MACHINERY

BE SURE WITH A KOEHRING FINISHER

GET THAT MECHANICALLY ACCURATE FINAL FINISH

. . . with a Koehring Longitudinal Finisher, and you are *sure* that the finish is in exact accordance with the crown specifications. Surface errors . . . excess or shortage of concrete affecting thickness of slab . . . is immediately detected . . . finisher screed accurately follows the crown of the slab. Various widths highway slab, airport runways and aprons, are easily, quickly and accurately surface-finished with a Koehring Longitudinal Finisher.

KOEHRING COMPANY, ***Milwaukee 10, Wisconsin***

. . . DEPEND ON YOUR KOEHRING DISTRIBUTOR

to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

KOEHRING HEAVY DUTY

ARMY E NAVY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

WRITE US

If you've ever had clutch trouble

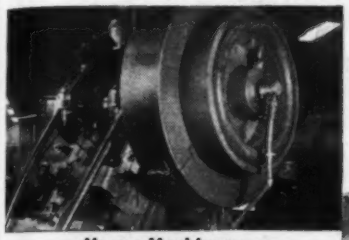
You'll want to know more about the clutch that controls power by air pressure—the Fawick Airflex Clutch.

It works without arms or levers or toggles or springs. No moving parts—nothing to lubricate or adjust. Low maintenance expense. Misalignment corrected automatically.

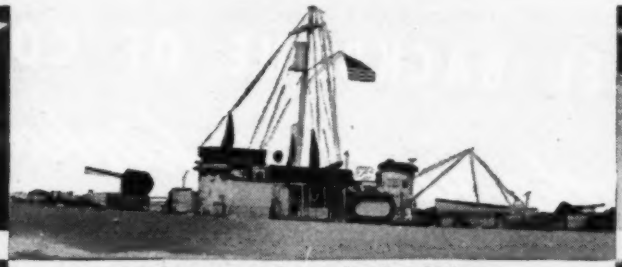
This new type of clutch just can't cause any of the conventional clutch troubles.

Proof? Certainly—in thousands of naval and merchant marine Diesel drives—in heavy duty drives for all kinds of machinery with tough jobs to do!

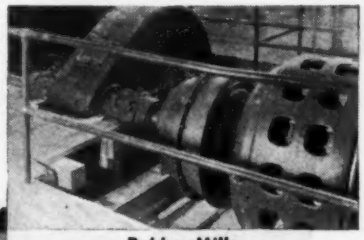
If you need a *trouble-free* Clutch, Brake or Flexible Coupling, our engineering department will be glad to make recommendations.



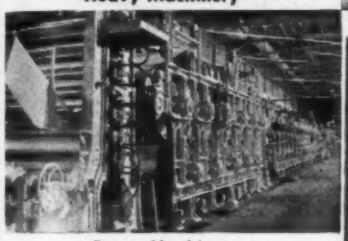
Heavy Machinery



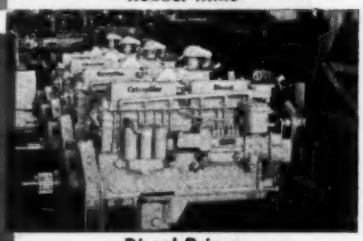
Destroyers — Tugs — Landing Craft



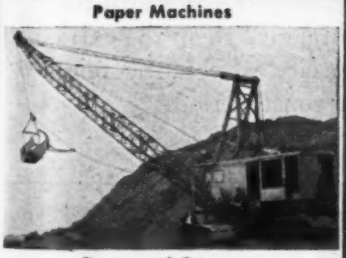
Rubber Mills



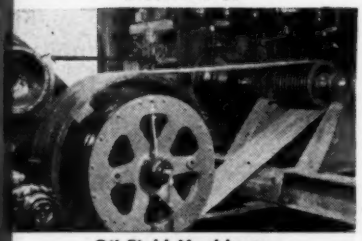
Paper Machines



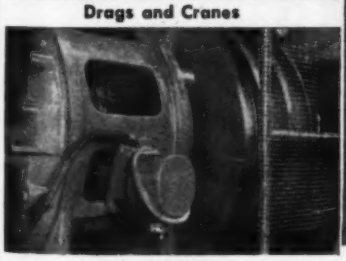
Diesel Drives



Drags and Cranes



Oil Field Machinery



Mine Hoists

Steel Mills

FAWICK AIRFLEX COMPANY, INC.

9919 Clinton Rd. · Cleveland 11, Ohio

In Canada, **Renold-Coventry Ltd., Montreal, Toronto, Vancouver**

In Britain, **Crofts Engineers, Ltd., Bradford, England**

FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

The Merritt Parkway is known for its scenic grandeur and riding comfort to motorists who use this main artery between New York and New England. Highway engineers know that it will give years of satisfactory service because it is reinforced with millions of square feet of American Welded Wire Fabric.

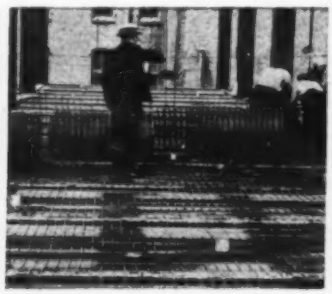
THE STEEL BACKBONE OF CONCRETE

for the nation's highways

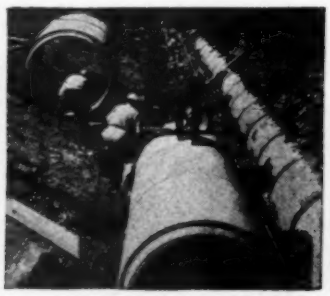
IN many of the nation's highways, American Welded Wire Fabric provides a backbone of steel that reinforces the concrete slab in every direction. The strength of the high-yield-point cold-drawn steel reduces the danger of cracking, spalling, and heaving, and, should cracks appear, wire fabric prevents their spreading. Installation is quick, easy, and inexpensive — it lies flat, and stays in place.

The heavy wartime loads that are passing over America's highways are proving the ability of wire fabric reinforced concrete roads to take terrific punishment. To safeguard the roads built for the future, give them the extra durability of steel. Specify wire fabric reinforcement for concrete construction.

Highways—Added years of useful life are built into highways which are reinforced with cold-drawn welded wire fabric.



Buildings—The cost of installing wire fabric is low—construction time is reduced. Here it is being used for reinforcing concrete floors.



Concrete Pipe — Engineers make long life and economy doubly certain by specifying wire fabric for reinforcing concrete pipe.

Airports—Runways, ramps, roadways and aprons will last longer and require less maintenance when reinforced with wire fabric.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

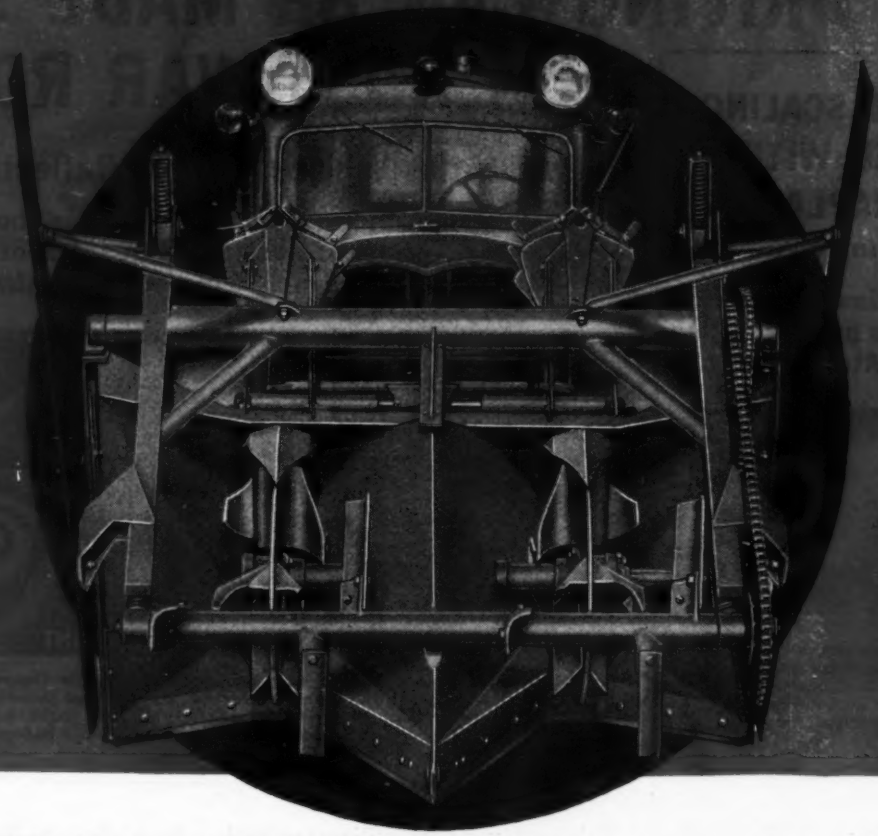
United States Steel Export Company, New York

AMERICAN WELDED WIRE FABRIC

UNITED STATES STEEL

BROS *Rotary* SNOW PLOW

establishes new records in SNOW REMOVAL!



Read This Statement Slowly—A Bros Rotary Snow Plow was put to work on a stretch of road blocked by drifts 12 to 14 feet high. These drifts were so firmly packed that snow plows could travel on them, and because of successive drifting, thawing and freezing, these drifts also contained several layers of blue ice, six to eight inches thick. This was the operating condition—one of the toughest ever faced—and the Bros Rotary Snow Plow cleaned that road down to the concrete.

The Bros Rotary Plow does its jobs as easily and smoothly as a reaper cutting grain. The plow is not plunged into the drifts but moves ahead at a constant pace, because, *as it moves, the revolving rake chews up the snow and ice* and feeds them to the powerful rotors, which discharge the load far to either side of the road.

Because plunging and bucking are eliminated, the Bros Rotary reduces truck maintenance and fuel consumption as much as 75%. There are no shocks or strains. All operations are hydraulically controlled from the cab. The plow may be removed from truck in less than one hour making it available for other classes of work.

Write for complete specifications, illustrations and other data. Get the details on the Bros Rotary—the plow that can do any snow job anywhere, faster and at lower cost.

WM. BROS BOILER & MFG. CO. MINNEAPOLIS, MINN.

DISTRIBUTORS IN ALL PRINCIPAL CITIES

CONCRETE HIGHWAY NEWS

Universal Atlas Cement Company (United States Steel Corporation Subsidiary)
Chrysler Building, New York 17, N. Y.

OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Duluth, Cleveland, St. Louis, Kansas City, Des Moines, Birmingham, Waco

NIGHT DRIVING CAN BE MADE SAFER ON POST-WAR ROADS

with Atlas White Concrete Reflecting Curb

Installations already made in a dozen states show safety factor of this new type curb. Results suggest its expanded use on tomorrow's new or modernized highways

Photographs showing smooth curb (foreground) and White Concrete Reflecting Curb under identical conditions. On a dry night (left) the marked increase in visibility of the White Reflecting Curb is clearly shown. On a wet night (right, taken during a heavy rain) the smooth curb is practically invisible, but the White Reflecting Curb shines out as a White Guide to Safety.

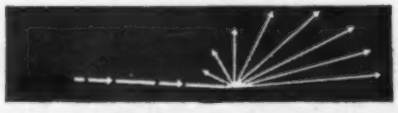
This new type curb utilizes the basic principles of light reflection to promote greater safety on highways.

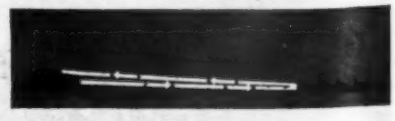
For greatest visibility the curb must reflect the car's own lights. To do this effectively the curb must first be white. Second, and equally important, it must reflect this light *in the right direction*, so that the curb is visible. Ordinary smooth curb reflects light away from the driver, and the curb is barely visible. But the saw-tooth faces of White Reflecting Curb made with Atlas White cement catch headlight rays and reflect them back, right to the driver's eyes. The curb stands out bright and clear. The diagrams below show the difference.

When rain at night makes highway and curb a watery mirror, this difference is even greater. Ordinary smooth curb is almost invisible. But White Concrete Reflecting Curb stands out more brightly than before—at the time it is needed most. Day or night, it's a white guide to safety.

For information on design and installation, write to our Atlas White Bureau. Ask for a copy of the book, "A White Guide to Safety."

A smooth curb (left) wastes light . . . reflects it up and away from the driver. A White Concrete Reflecting Curb (right) conserves light . . . reflects it back to the driver. A smooth curb is barely visible at night; a White Concrete Reflecting Curb stands out—bright and clear.





PAVEMENT SCALING CHECKED WITH ATLAS DURAPLASTIC*

air-entraining cement

More than 60 installations in a dozen states prove results of Universal Atlas research

Minneapolis street photographed after four winters of salt de-icing treatment. Left lane, laid with normal portland cement, is badly scaled. Right lane, laid at the same time with Atlas Duraplastic, is practically scale-free.

Developed by Universal Atlas after 6 years of tests and research, Atlas Duraplastic is a true portland cement in which a small amount of air-entraining material, precisely determined for proper performance, is interground during manufacture.

Five years' experience shows that it makes concrete paving highly resistant to scaling due to action of de-icing salts, and protects it against the effects of freezing and thawing weather. It makes concrete more workable, minimizes segregation and bleeding, increases durability, permits earlier finishing. No additional materials are needed at the mixer.

For reports on city and state test highways and on the original research, write to our Technical Service Bureau.

*Trade mark registered, U. A. C. Co.; all rights reserved.

#5-CD-2

UNIVERSAL ATLAS CEMENTS

UNIVERSAL PORTLAND · ATLAS PORTLAND · ATLAS WHITE · ATLAS DURAPLASTIC · ATLAS HIGH-EARLY

LIMA

MARKS of LEADERSHIP

The name LIMA on a shovel, crane or dragline is recognized as a mark of *leadership* by users who keep abreast with the latest in power excavator design and performance. LIMA has always been a *leader* in the designing and perfecting of new and practical features to help increase production and to lower operating cost on earth moving projects. This continuous search for new and better methods of doing things has been responsible for many outstanding advancements in excavator design. When you buy your next shovel, crane or dragline be sure it is a LIMA and get these modern distinctive features:

1. Anti-friction bearings at every vital bearing point for greater power and efficiency.
2. Independent clutches—hoist, swing, travel, boom up or down simultaneously.
3. Big wide drums for maximum cable economy.
4. All shafts on which are mounted sliding members are splined for accuracy in fit and elimination of backlash.

These advantages plus the extra power and ruggedness of LIMA shovels, cranes and draglines are qualities you must have for greater output day in and day out.

Keep Buying WAR BONDS

LIMA LOCOMOTIVE WORKS, INCORPORATED

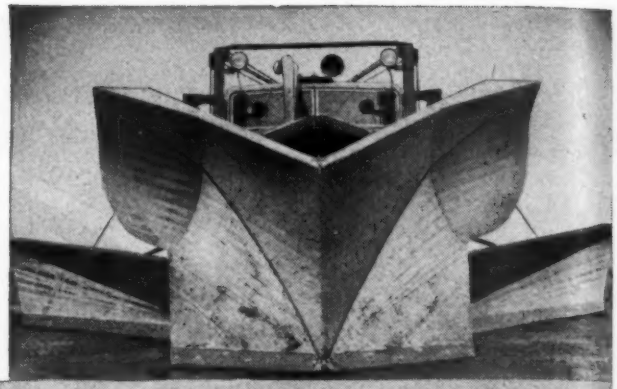
Shovel and Crane Division

LIMA, OHIO, U. S. A.

NEW YORK, N. Y. PHILADELPHIA, PA. MEMPHIS, TENN. ST. LOUIS, MO. NEWARK, N. J. PORTLAND, ORE.
DALLAS, TEXAS SEATTLE, WASH. SAN FRANCISCO, CALIF. LOS ANGELES, CALIF. SPOKANE, WASH.
MINNEAPOLIS, MINN. MONTREAL, QUEBEC, CANADA VANCOUVER, B. C.

SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS
DRAGLINES, VARIABLE

IT'S THE TRUCK BEHIND THE PLOW THAT COUNTS!



WALTER SNOW FIGHTERS

THERE ARE MODELS TO MEET EVERY SNOW CONDITION,

topped by the 250 H.P. Walter Snow Fighter. This powerful unit clears a 28 ft. width in one run—has rugged power to smash through road-blocking drifts plus speed to clear more miles per hour—throws snow far to the side to make widening-out easier.

The first requirement for efficient snow removal is a specialized truck having great Power, Traction and Speed. Without these, the best designed plow equipment is mere "window-dressing"!

Walter Snow Fighters have all three—Power, Traction and Speed—in an advanced degree. They're designed specifically for the tough job of snow removal. The exclusive Walter Four-Point Positive Drive eliminates slipping, stalling and wheel-spinning . . . by proportioning power to FOUR driving wheels according to their *traction* at any instant.

Suspended Double Reduction Drive (with the first reduction gears suspended from the frame instead of in conventional axle housings) results in higher ground clearance, less unsprung weight, larger gear capacity, better protection for parts. Tractor type transmission provides six speeds forward, two reverse, fast high gear and powerful low gear *with single lever control.* Write today for full information.

WALTER MOTOR TRUCK COMPANY • 1001-19 IRVING AVE., RIDGEWOOD 27, QUEENS, L. I., N. Y.

YOUR LINK-BELT SPEEDER HAS GONE TO WAR ON FRONTS ALL OVER THE WORLD

FROM DARKEST AFRICA

TO THE ALASKA HIGHWAY

9861

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

are you planning now for BETTER POSTWAR HIGHWAYS?

When Victory is won, your highway construction plans will play a vital part in making jobs for returning service men and workers now in war industries. It is desirable and important that these plans be ready.

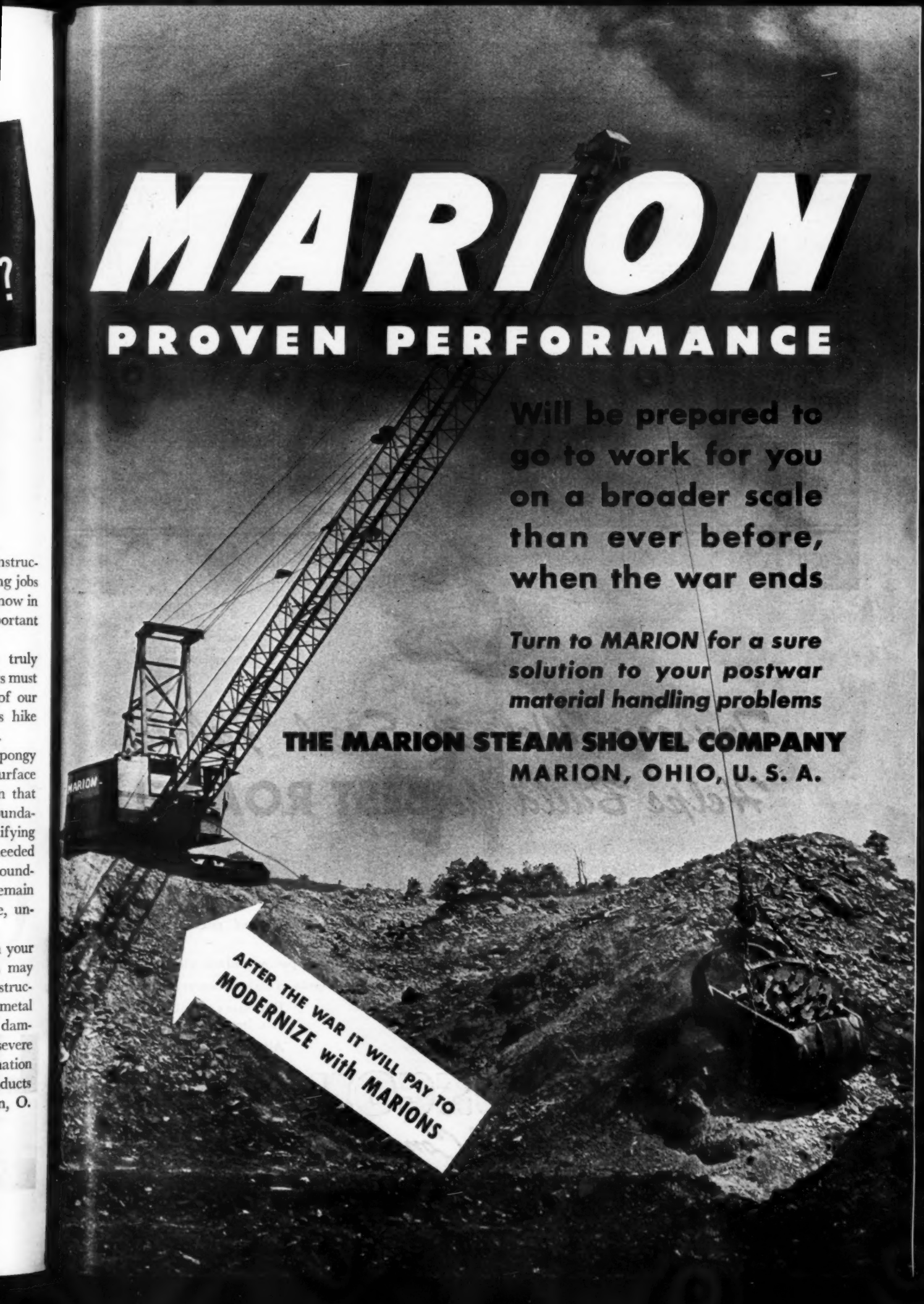
It is also important that they be truly "plans for the future." Postwar highways must not be subject to the ills of so many of our present roads, where annual breakups hike maintenance budgets and delay traffic.

Experience proves that wet and spongy subgrades are a major cause of road surface failures. Isn't it logical to make certain that postwar roads are built on a stable foundation? You can help do this by specifying ARMCO Perforated Pipe wherever it is needed to intercept and remove harmful groundwater. Then maintenance costs will remain low while traffic enjoys a smooth, safe, uninterrupted ride.

So include ARMCO Perforated Pipe in your plans for the future, even though you may not be able to get it for immediate construction. You'll like its flexible corrugated metal strength, tight joints, and immunity to damage from shifting soils, traffic impact or severe frost action. Write for whatever information you may need. Armco Drainage Products Association, 415 Curtis St., Middletown, O.

ARMCO

ARMCO PERFORATED PIPE


MARION
PROVEN PERFORMANCE
Will be prepared to go to work for you on a broader scale than ever before, when the war ends
Turn to MARION for a sure solution to your postwar material handling problems
THE MARION STEAM SHOVEL COMPANY
MARION, OHIO, U. S. A.
AFTER THE WAR IT WILL PAY TO MODERNIZE with MARIONS

Truscon Welded Steel Fabric Helps Build the BEST ROADS!

Safeguard public funds in the highways which you plan . . . assure long-lived, full-value highway construction . . . by depending upon Truscon Steel Fabric for road protection.

Here's what Truscon Welded Steel Fabric assures:

Provides resistance to cracking due to shrinkage of concrete during setting period.

Provides tensile strength necessary to resist subgrade friction.

Provides increased resistance to cracking in concrete slabs, which has been created by the expansion and contraction of subgrades.

Provides increased resistance to cracking of concrete due to load.

Prevents the development of microscopic cracks into visible cracks.

Prevents cracks from opening and allowing entrance of water.

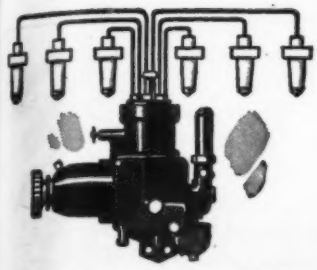
Prevents broken ends of slabs from separating at a crack.

Decreases spalling and progressive breakage.

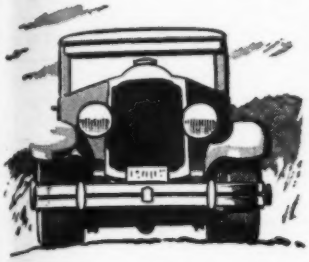
All these, and other advantages, will help build more wear-life into public highways with Truscon Welded Steel Fabric Reinforcement and associated roadbuilding products.

TRUSCON
Steel Company

SUBSIDIARY OF REPUBLIC STEEL CORPORATION • YOUNGSTOWN 1, OHIO



Dependable diesels are not built in a day. For instance, in perfecting the *exclusive* Cummins Fuel System, now an accepted model of simplicity and efficiency, 3,000 different injection mechanisms were developed and tested between 1923 and 1927 before Cummins engineers were satisfied. Insistence on "making it right," regardless of cost, explains why Cummins Diesels are known everywhere as *the dependable diesel.*



A Cummins-powered Packard sedan was the world's first diesel-propelled automotive vehicle. Driven in 1930 from Columbus, Ind., to New York City by designer-president C. L. Cummins at a fuel cost of only $1.38, the car was barred from the New York Auto Show and, later, the Atlantic City Road Show. Today, Cummins Diesels are found in practically all leading makes of heavy-duty trucks and construction equipment.

In 1930, under AAA sanction, the world's first official record for diesel-powered vehicles was established at Daytona Beach, Florida, by a Cummins Diesel installed in a Packard roadster—83 mph. The engine was a "dolled up" Model U designed for marine service. Although built to operate at 800 rpm., it was revved up as high as 1900 rpm. during the run, without any difficulties developing.

CUMMINS DEPENDABLE DIESELS

Automotive Models: Designed for all types of heavy-duty trucks in either highway or off-the-highway service.

★ ★ ★

Industrial Models: Portable and stationary engines, power units, and generating sets for service in any industry requiring heavy-duty power.

★ ★ ★

Marine Models: Propulsion engines and marine type generating sets designed for all types of fishing boats, work boats, and pleasure craft.

Makers and Breakers of Precedents in Power

In the early 20's, most authorities conceded 600 rpm. to be "tops" for a diesel. Cummins conceded nothing—bumped the Cummins Diesel of that early day up to 900 rpm. and kept right on bumping. That's how the modern, high speed diesel was created . . . by making and breaking one precedent after another . . . by doing things in design, construction and metallurgy "that couldn't be done." As a result, today's high speed Cummins Dependable Diesels are doing tough, heavy-duty jobs scarcely dreamed of twenty, or even ten, years ago. Not only doing them, but doing them cheaper, better and faster than they were ever done before. CUMMINS ENGINE COMPANY, INC., Columbus, Indiana.

HANSON

Outstanding in the design of the HANSON TRAILERS are the strength and rugged construction of the trailer frame. Steel beams extend full length of frame and are supported by cross members and gusset plates which brace the frame and help to distribute load evenly throughout frame members. The goose neck is so designed that front axle mounting can make full right angle turn. Oscillating rear axles reduce road shock of both the trailer and the machinery being transported to a minimum as the wheels conform to the contour of the road and maintain a uniform platform level impossible to obtain with rear spring construction. Timken Taper Bearings throughout. Brakes may be had, either manually operated, air or vacuum controlled.

Why not write and tell us your requirements?

MACHINERY TRAILERS

Semi or Full — 6 to 60 Ton Capacity

TRAILER SPECIFICATIONS

MODEL	Capacity	Platform Width	Platform Length	Platform Height	Platform Thickness	Tires Front	Tires Rear	Axles Front	Axles Rear	Front Springs	Ground Clearance	Weight Pounds
P-6	6 Tons	7' 6"	12' 0"	30"	2" Ash	2-10 ply 7.50x15	4-8 ply 7.50x15	2¾"	3"	2 3"x42" 14 lvs.	16"	6400 lbs.
P-8	8 Tons	8' 0"	13' 0"	30"	2" Ash	4-8 ply 7.50x15	4-10 ply 7.50x15	2⅞"	3"	2 3"x42" 14 lvs.	16"	7300 lbs.
P-10	10 Tons	8'0"	14' 0"	30"	2" Ash	4-8 ply 7.50x15	8-8 ply 7.50x15	2⅞"	3"	2 3"x42" 14 lvs.	16"	8200 lbs.
P-12	12 Tons	8' 0"	15' 0"	30"	2" Ash	4-10 ply 7.50x15	8-8 ply 7.50x15	3"	3½"	2 3½"x42" 14 lvs.	15"	9300 lbs.
P-15	15 Tons	8' 0"	16' 0"	33"	2½" Ash	4-12 ply 9.75x24	8-10 ply 7.50x15	3½"	4"	2 3½"x42" 14 lvs.	15"	12500 lbs.
P-15 W	15 Tons	9' 0"	16' 0"	33"	2½" Ash	4-12 ply 9.75x24	8-10 ply 7.50x15	3½"	4"	2 3½"x42" 14 lvs.	15"	13300 lbs.
P-20	20 Tons	9' 0"	18' 0"	34"	2½" Ash	4-12 ply 10.50x24	16-8 ply 7.50x15	4"	4½"	2 3¼"x46" 16 lvs.	15"	15200 lbs.
P-25	25 Tons	9' 6"	18 0"	34"	3" Ash	4-16 ply 12.75x20	16-8 ply 7.50x15	4"	4½"	2 3½"x46" 16 lvs.	12"	17100 lbs.
P-30	30 Tons	10' 0"	20' 0"	25"	3" Ash	4-16 ply 13.50x20	16-10 ply 7.50x15	4½"	4½"	4 3½"x46" 16 lvs.	10"	20200 lbs.
P-40	40 Tons	10' 0"	20' 0"	28"	3" Ash	4-16 ply 13.50x24	16-10 ply 9.00x15	4½"	4¾"	4 3½"x46" 16 lvs.	10"	22000 lbs.

The HANSON CLUTCH & MACHINERY Co.

Phone 417 — **Tiffin, Ohio**

WELLMAN WILLIAMS TYPE BUCKETS

Williams Buckets have been famous for their many fine mechanical details for nearly 40 years. Since 1931, Williams Buckets have been built by Wellman.

WELDED CONSTRUCTION, featured in Wellman custom-built buckets, which made them so predominant in heavy duty steel mill service, is now applied to all

Wellman-Williams Buckets

FOR LONGER SERVICE WITH LESS MAINTENANCE COST

Built in Multiple Rope, Power Arm, and Power Wheel Types in 3/8 yd. to 16½ yd. capacities.

Send for Free Bulletin Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

THE WELLMAN ENGINEERING COMPANY

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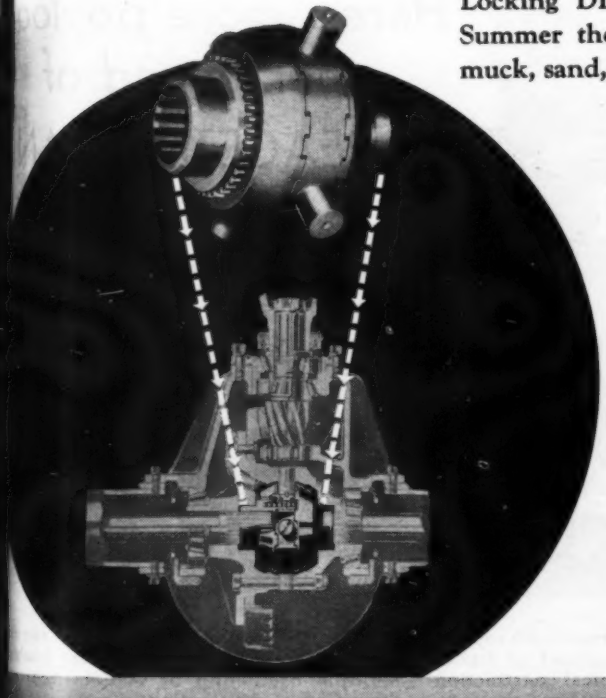
Sales and Service Agencies in principal cities.

Year 'Round
TRACTIVE PERFORMANCE

No More Stuck Truck JITTERS

Nothing seems to faze the truck equipped with the amazing Locking DIFFERENTIAL by THORNTON. Winter or Summer they "plow" right on through deep snow, mud, muck, sand, soft fields . . . or safely over sleet, ice, or slippery surfaces. Other trucks would stall.



Automatic in operation, this THORNTON Locking DIFFERENTIAL eliminates one wheel going dead and the other spinning. Both wheels *must* rotate when power is applied.

This means positive traction . . . longer life for tires . . . safer driving on slippery roads . . . fuel and oil, man-power, and towing savings.

Equip your trucks . . *now* . . . with THORNTON Automatic-Locking DIFFERENTIALS.

MODELS AVAILABLE

Models readily available for the following 1½-2 ton, single axle trucks: Chevrolet, Ford, G.M.C., International, Reo, Studebaker.

THORNTON TANDEM CO.
8759-E GRINNELL AVENUE • Plaza 9700
DETROIT 13, MICHIGAN, U.S.A.
Make Big Trucks Out of Little Ones with the THORNTON Four-Rear-Wheel DRIVE

In U. S.: Sold by Truckstell Distributors

TEAR OUT AND MAIL

Thorton Tandem Co.
8759-E Grinnell Avenue
Detroit 13, Michigan, U.S.A.
Please send me data on your Thornton *Automatic-Locking Differential.*

Name.....
Address.....
Make Truck.....
Street.....
City.....*Zone*.....*State*.....

U. S. A. Signal Corps Photo

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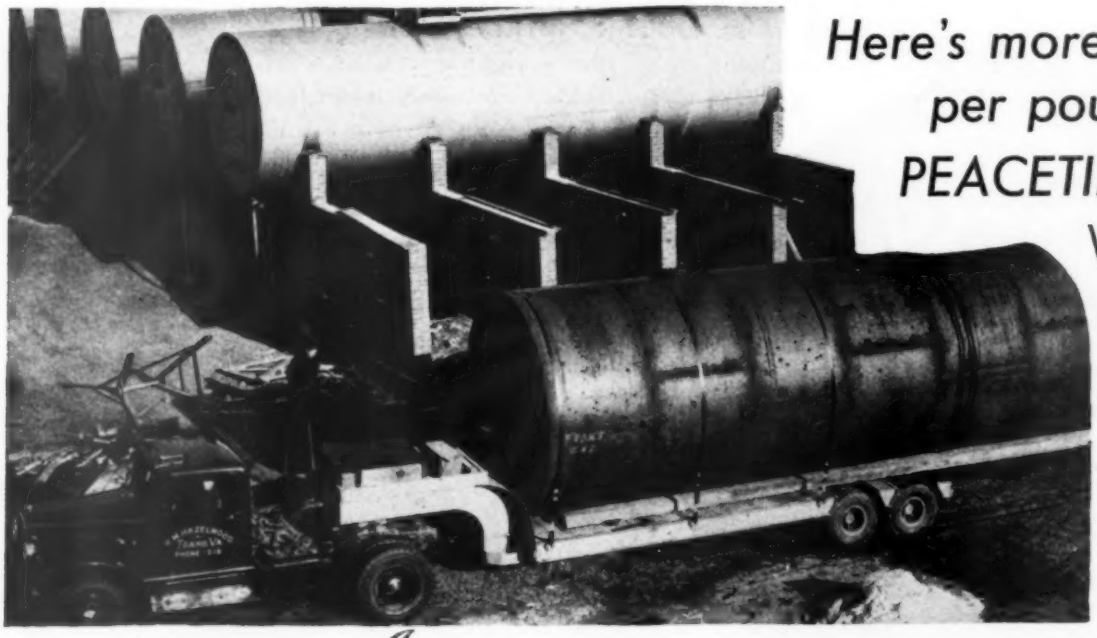
ON ACTIVE DUTY WITH U. S. ENGINEERS IN INDIA

The GALION IRON WORKS & MFG. CO.

Main Office and Works: GALION, OHIO



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per pound of
PEACETIME AN
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OR WHEEL
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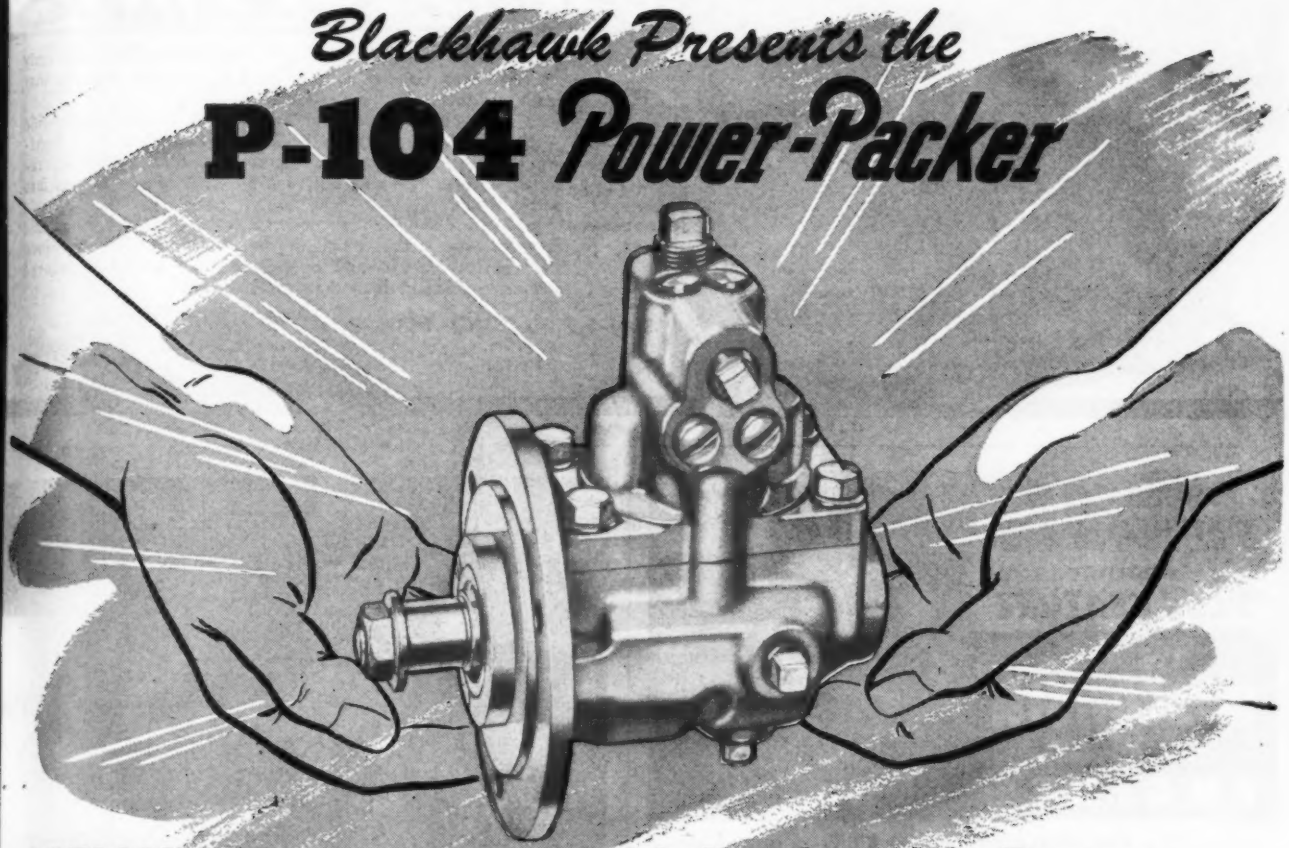
JAHN Heavy Duty TRAILERS
Capacities from 5 to 100 TONS

JAHN TRAILERS have earned their reputation of more payload per pound of trailer because of the many mechanical construction features which insure maximum strength, rigidity, smoothness of operation and long life. Frames are welded, deep, wide flange, main beams with substantial cross members and outriggers. Inproved "goose neck" construction, spindles of special heat-treated alloy steel, and heavy cast wheels are of ample size to stand up under heavy road shocks and occasional overloads. Radius rods, brake cross-shafts, and all other points requiri lubrication are fitted with bronze bushing Multiple oscillating or tandem rear axl assure equal distribution of weight over tires even when passing over the rough ground. Every detail is fabricated with treme care and skill. No Jahn Trailer has ev failed from carrying its rated capacity loa JahnTrailers can be quickly converted to sem trailers by disconnecting king pin lock a removing front dolly. For all heavy-duty trail problems—Come to "Trailer Headquarters

"Come to Trailer Headquarters" **C. R. JAHN COMPANY,** 1345 W. 37th Place, Chicago 9, Illino

Blackhawk Presents the

P-104 *Power-Packer*



NEW! POWER-DRIVEN Hydraulic Pump . . .

For More Efficient Operation of Snow Plows and Road Machinery . . . Easily Installed!

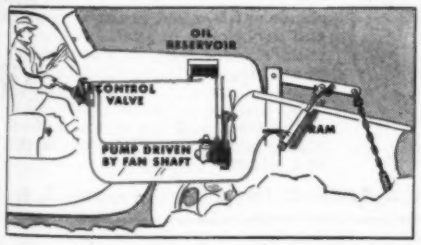
This inexpensive, power-driven hydraulic pump has been perfected to replace hand-operated pumps, mechanical devices and complicated power take-offs. It operates from fan belt or crankshaft and develops internal hydraulic pressure of 4,000 lbs. per sq. in.—raises 500 lbs. or 50 tons, easily, fast, safely! Control valve is mounted in cab. Ram operates at top efficiency in any position.

Plan to modernize your present equipment with the P-104 Power-Packer. It is easily installed on snow plows, bulldozers, trucks, scrapers and other road machines. *Be sure to specify* the Blackhawk P-104 on *all* new equipment as you order it.

For complete information on the P-104 Power-Packer, write your equipment manufacturer—or write direct to Blackhawk.

A Product of **BLACKHAWK MFG. CO.,** Dept. RS, Milwaukee 1, Wisconsin

Example of Typical P-104 Application



BLACKHAWK

High-Pressure Hydraulics

on ROGERS TRAILERS

GETTING there "fustest with the mostest" as one early American General aptly phrased it, is battle strategy that really conquers!

In the lightning speed of mechanized warfare tanks ride "Pick-A-Back" to battle on ROGERS TRAILERS so their fighting capacity is unimpaired. Special ROGERS TRAILERS retreive disabled tanks so they can be repaired and rushed into battle again.

EXPERIENCE *builds 'em* PERFORMANCE *sells 'em*

ROGERS TRAILERS are doing a real war job at home and abroad. New models which will be available to industry when war contracts are completed will be even better-engineered and more efficient than their predecessors.

ROGERS BROS. CORPORATION
ALBION,
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SUPER-FINISHED **CRANKSHAFTS**

another **"PLUS FEATURE"**

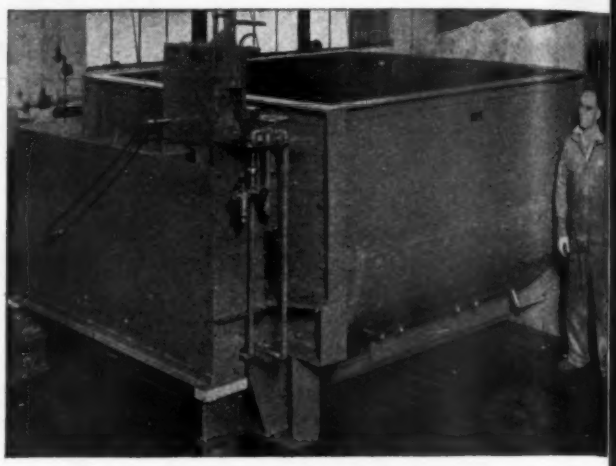
IN ALL **WISCONSIN** *Air-Cooled* **ENGINES**

The very ingenious, specially designed machine illustrated above, puts a mirror-smooth *superfinish* on the crank-pins of all Wisconsin Air-Cooled Engines. By combining perfectly synchronized rotating and oscillating polishing movements, absolutely uniform diameter is maintained over the full length of the crankshaft bearing surfaces.

This is just another of the many small, but *important production details* that account for Wisconsin heavy-duty serviceability and smooth, efficient operation. Just another reason, too, why *your equipment* should be powered by a Wisconsin Engine.

Most H.P. per pound

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines



Modernize Your Asphalt Plant by Installing an H & B MIXER

● H & B Asphalt Mixers are designed and built to give continuous, trouble-free, economical service under the most severe operating conditions. Careful engineering study, backed by nearly fifty years of specialized experience and applied to the suggestions and experience of practical plant operators, insures equipment that is dependable, economical, durable. 15 standard models (both steam and hand operated) ranging in batch capacity from 400 lbs. to the 8,000-lb. giant shown above. Write for literature and prices.

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ARMY E NAVY

FOR TOUGH ASSIGNMENTS

The PERFECTION "Series 7400" Steel Platform Stake Bodies, with their improved features of construction, deliver a fuller measure of service for each dollar expended. For all makes and models of trucks. See a PERFECTION distributor—write for the names of those nearest you.

THE PERFECTION STEEL BODY CO., Galion, Ohio

PERFECTION

TRUCK BODIES AND HOISTS

JOB DOWN!

8 hours . . . or . . . 11 days?
808 yds. . . . or . . . 8888 yds?
$62.88 . . . or . . . $691.68?

● When a vital part snaps and the job is stalled you begin to do some real figuring. Suppose you were renting a tractor, bulldozer and scraper and there was a 1000 foot haul, the bulldozer being used as a pusher serving the scraper.

If you had to send to the factory for the new part you'd be 11 days behind, still have 8888 yds. of dirt to move and be out $691.68 plus the cost of the new part and your normal profit on the job.

But—because you find an A. E. D. member near your job—he has the part, or the men and equipment to make and install the part, it only cost you 8 hrs. delay—808 yds. and $62.88 in lost rental and operator's time.

There are more than 500 A. E. D. members ready to save you dangerous delays on that rush war-time job. As neighbors of yours they do double duty—First to save you money and time—second to bring the manufacturers' full service to your doorstep.

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LOOK FOR THE A.E.D. INSIGNIA—THE SYMBOL OF GOOD SERVICE

More pull, less slip with O-P-E-N C-E-N-T-E-R traction

Le Tourneau Super Tournapull and Carryall Scraper on Goodyear Sure-Grips

THE bigger your prime movers, the greater yardage you're handling, the more need you have for tires that won't cake up and spin.

That's why more and more contractors are specifying Goodyear Sure-Grips. This great tire's time-proved O-P-E-N C-E-N-T-E-R *self-cleaning* tread has no dead-end pockets, no mud traps to fill up.

Its big, wide, unblocked channels sluice out dirt and stones, leaving those big, massive lug bars clean and free to bite deep and pull in any going.

As a result you get more draw-bar pull, more speed, more round trips per shift, more yardage moved per unit—*more work at less cost!*

Add the greater toughness of Goodyear's exclusive multiple-compounded construction, plus the extra strength of Goodyear's Supertwist cord carcass, and you get the longest-lasting, hardest working tire ever built.

Just ask the men who are using them. Once you've heard their story, you'll want Goodyears on all your units.

THE RIGHT TIRE FOR EVERY JOB

HARD ROCK LUG for all rock work

ALL-WEATHER EARTH-MOVER for drawn vehicles

SURE-GRIP for mud and marsh

Sure-Grip, Supertwist, All-Weather—T.M.'s The Goodyear Tire & Rubber Company

A PRODUCT OF GOODYEAR RESEARCH

GOODYEAR

THE GREATEST NAME IN RUBBER

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

ROADS AND STREETS

September, 1944, Vol. 87, No. 9

Airport Methods at Matagorda

Brown & Root, Houston contractors, completed two million ton-miles of barge hauling and 900,000 cu. yd. of dredge fill to enlarge two airfields, located on isolated sand strips off the Gulf Coast. Fields depend largely on surface ("valley") drainage

By HAROLD J. McKEEVER
Editor, ROADS and STREETS

YOU must cross salt water to reach this pair of interesting airport jobs. Both lie along low, treeless, storm-swept sand strips. To all appearances you'd think these spots were on some far-away desert island or off-shore base, but they're not. They're on Texas soil, down along Matagorda Island and Matagorda Peninsula off Port O'Connor to be specific.

Isolation for military operational reasons was the aim in locating the fields here. The Houston contracting firm of Brown & Root, which transported thousands of tons of material to the fields by rail, highway and barge, will testify that this aim was certainly achieved. The jobs were marked by supply and transportation difficulties, but construction hindrances were found to be outweighed by the operational advantages of the sites, as evidenced by the present contracts for additions.

The recent Brown & Root contracts cover enlargement of fields built in 1942. The Matagorda Island project included 415,000 cu. yd. of hydraulic sand fill; 300,000 cu. yd. of balanced scraper excavation; three 4,100 x 150 ft. hot-mix runways plus concrete apron and taxiways on a processed sand-shell base; leveling for surface drainage; and topsoiling, seeding and mulching. Island contract, let in January, was for about $1,300,000.

The $1,400,000 Peninsula project, located a few miles north of the Island, comprised 485,000 cu. yd. of hydraulically placed sand-shell fill, sand shell pavement base with rock asphalt top. Considerable dune sand was moved to get glide angle clearance, along with other leveling. Whereas the Island project involved no under-drains, the Peninsula utilizes three storm culverts, clearance of which was a controlling element in establishing the level of the field, runway gradients and fill quantities.

Both sites before improvement lay partly submerged at high tide, most of the areas lying below 4 or 5 ft. elevation. Dredge filling was designed to raise the general level so as to provide runway elevations about 6½ ft. to 8 ft. above datum. Average fill depth was about 4½ ft.

Dredges Maintained High Production

Dredge filling at the Island was handled by Brown & Root, who were aided by the availability of an abundance of acceptable beach sand. Two dredges were employed. Cne, the 250-hp. "Ranger," converted for the job from 10-in. to 12-in. suction and discharge, delivered about 4,000 cu. yd. per 24-hours. Its work was to stock-pile 50,000 cu. yd. for the apron fill, located an average of 7,000 ft. from the dredge or beyond the economic limit of hydraulic placement.

The other dredge was the 650-hp. "Temple," a 12-in. outfit which deliv-

Rock Asphalt Goes to Sea!

Over 20,000 tons of rock asphalt and like tonnage of hot-mix materials were moved across 10 miles of salt water in 200-ft.-long barges. A fleet of barges plied back and forth carrying equipment and supplies

(Left): Brown & Root's slip, supply dock and rock asphalt stockpile 17 miles from the railhead

(Second photo): The hydraulic sand fill was placed with 90% recovery, as result of careful use of dykes and weir boxes

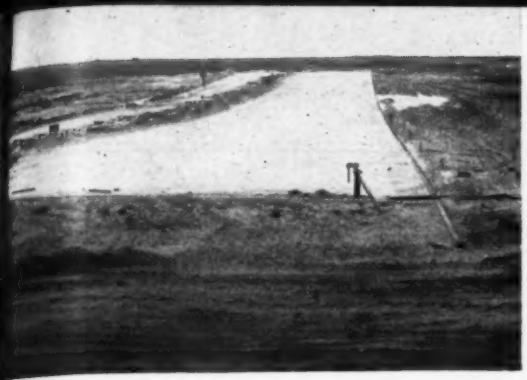
ered the remarkable max. output of 9,000 cu. yd. of sand per day through a 3,500-ft. line.

By skillful use of dykes and weir boxes the double result was accomplished of recovering about 90% of the material pumped and leaving the fill sloped to conform closely with the 1½% valley-drainage slopes of the completed field. Very little blade and scraper work was necessary. Government engineers characterized this as one of the most uniform and accurate dredge filling jobs in their experience.

On the Peninsula project the Gulf Coast Dredging Company of Galveston performed the hydraulic work, and also did an excellent job, aided by government-owned dredges brought in to offset a 30-day starting delay due to parts and labor shortage in dry-dock. Sub base material consisted of oyster shell, furnished by Heldenfels Bros. of Rock Port, Tex., and by Bauer & Smith Dredging Co., of Port Lovoca, Tex., and was dredged from near by oyster reefs and barged to both projects. The Gulf Coast dredges consisted of the "Valasco," a 350-hp., 18-in. unit which pumped about 1,200 cu. yd.; and the 750 hp. "Matagorda" with 20-in. suction and 18-in. discharge, which delivered 4,000 to 5,000 cu. yd. daily through 3,500 ft. average line.

(Left): Blade manipulation of sand and shell for pavement base preparatory to windrowing for passage of traveling plant

(Below): Traveling plant road-mix machine processing sand-shell mixture for runway base at Matagorda Island, on Texas coast. Windrows are spaced 7 ft. Brown & Root, of Houston, contractors



(Left): This noticeable dip in the taxiway profile was designed to carry the pavement across a valley drainageway (see Fig. 2). Surface run-off will flow across the concrete, which slopes 0.5% transversely in direction of flow. (Right): The joint cleaning and sealing crew on concrete aprons didn't wait for removal of the heavy blanket of curing sand, but cleared sand away from joints and went ahead

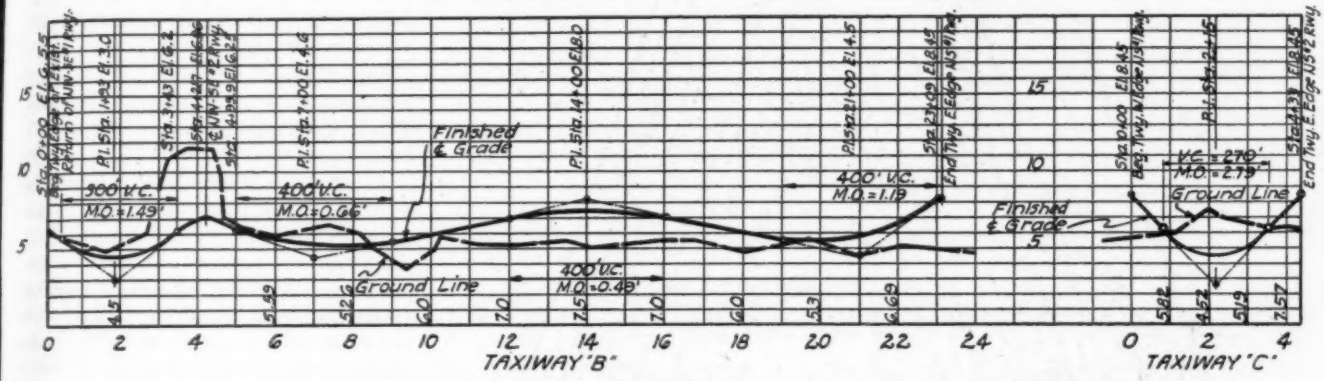


Fig. 1. Plan of valley drainage adopted for low-lying beach airfield extension by the Galveston office of U. S. Engineers

The 20-in. government dredge "Omega" pumped 5,000 cu. yd. daily through a 5,000 ft. line.

The heavy shell ran to 45% to 55% of the flow, a ratio which took plenty of horsepower and necessitated pumping clear water part of the time to get the material through the pipes.

On both projects the specifications allowed a tolerance of from 12 in. above to 6 in. below grade along the runway centerline, and 6 in. and 6 in., respectively, on slopes and shoulders.

Transportation, a Barge Job

All the 22,000 tons of rock asphalt had to be shipped in from West Texas via Victoria, 67 miles along a branch rail line to the town of Sea Drift, thence 17 miles by truck to Port O'Connor, and finally by barge 10 miles to the sites. Moved in the same manner was a similar tonnage of asphalt, sand and limestone for the hot-mix and concrete, along with cement, machinery and supplies for the two jobs. The barge trips to the Island job followed (part of the way) the Intercoastal Canal channel, dredged several years ago. About 1,000 tons a day maximum was delivered to each project.

Shell for pavement base required 9 to 10 and 33 to 35 miles barge haul, respectively, to the two jobs. Other than the hydraulic sand and shell, the only strictly local material was topsoil, which was found in sufficient quantity and quality for mulching.

Yes, there was another local ingredient, water. Mixer and sprinkler water (and for drinking and general army post use) was obtained through twenty-three shallow wells on one project and two deep wells on the other. Reservoirs were drawn on to meet peak construction requirements.

Handling of Materials

Runway materials were received at the Sea Drift rail head, unloaded by clamshells (up to 30 cars daily) and trucked to stockpiles alongside a 100 x 100 ft. slip and loading dock at Port O'Connor. Rock asphalt was transported in a 175 x 30-ft. barge of 12-ft. draft, having a capacity of 1,000 tons but loaded to only 750 tons due to shallow water. Several other large barges were later converted for bringing in base-course shell. All loading and unloading was by clamshell cranes of 1½ to 3 yd. bucket capacity.

In summary there were 14 barges on shell, 2 on cement, 3 on aggregates and rock asphalt, 1 each on fuel, equipment and liquid asphalt emulsion; also 5 tug boats, 2 shell dredges and crew boats, on the two cement barges, sacked cement was stacked on board by hand from truck driven on, and covered with 40 x 90-ft. tarpaulin en route. In his concern over protecting the cement, the contractor

(Left): Material for sand-shell base was dumped on the dredged shell fill in accurately spaced piles. Matagorda Peninsula project. (Right): On the Peninsula project Brown & Root's elevating grader took up soft, easy handling mulching soil in 12 to 16 in. cuts.

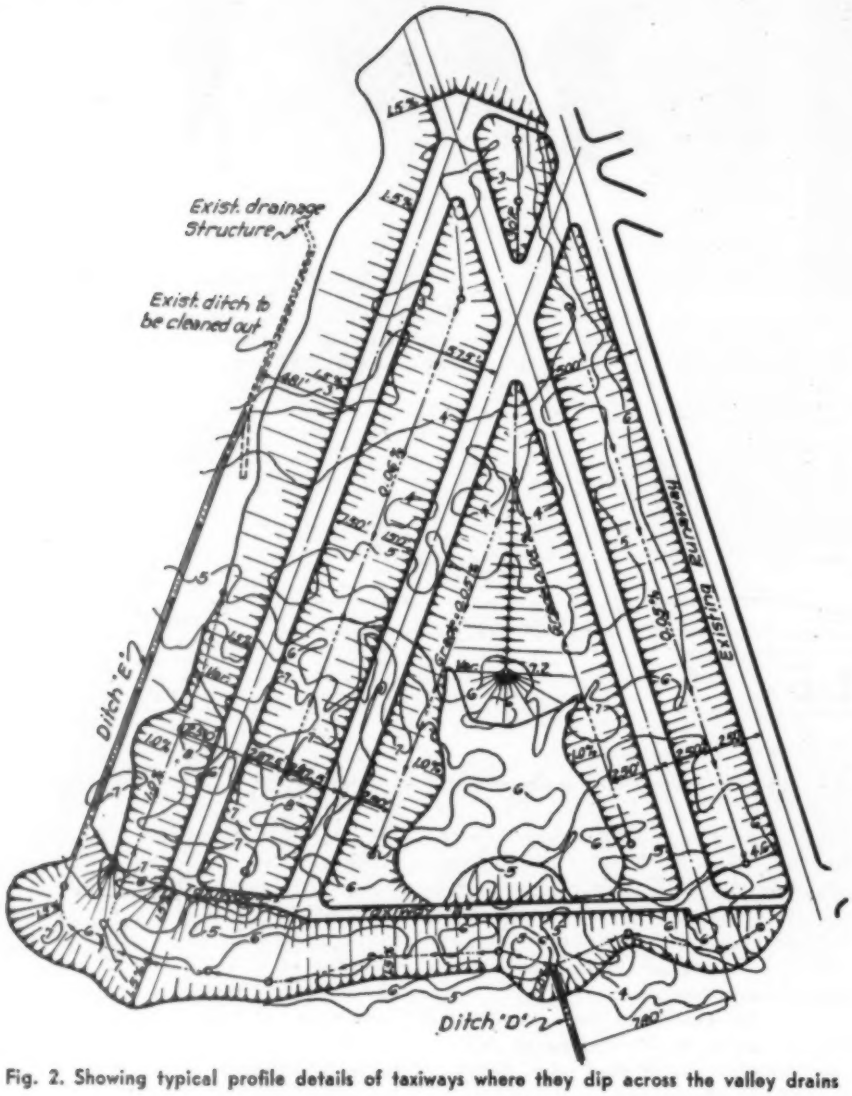


Fig. 2. Showing typical profile details of taxiways where they dip across the valley drains

considered a storage house on this barge, but did not build it on finding that the space was needed for trucks during unloading. Cement was unloaded by ½-yd. dragline bucket equipped with a specially designed "pan," using only 2 men on the barge.

Road-Mix Sand-Shell Base

After raising the hydraulic fill to grade tolerance it was given 3 to 5 days to drain before going in with grading equipment. Then began the work of bringing the entire field area to contour with scoops, blades, sprinklers and pneumatic rollers.

Next was constructed a 6-in. sand-shell flexible base course by road-mix methods. Trucks spotted 4-cu-yd. loads of shell at measured intervals to provide roughly two-thirds the material for an 8-in. loose layer. The shell was bladed out, sand was dumped and spread, and the material manipulated with blades, windrowed, then run through a traveling road-mix plant, shaped up, sprinkled and compacted with sheepsfoot and pneumatic rollers.

The base was shot with about .35 to .4 gal. asphalt emulsion per sq. yd., which usually had plenty of time to cure. An open-texture stabilization was the aim rather than a "seal." About 450,000 sq. yd. of base was thus constructed on the two projects.

The sand-shell base specifications called for shell of the following analysis by weight:

Retained on 2" sq. sieve....	0- 7%
Retained on 1" sq. sieve....	10-35%
Retained on 40-mesh.....	85-95%
Passing 200-mesh.....	0- 6%

A silty sand was used, about one part sand to three of shell, loose measure, at or slightly above optimum moisture. Soil binder in the sand-shell mixture (material passing 40-mesh) was required to have a liquid limit not exceeding 35, plasticity index, not less than 3 or more than 12, and shrinkage not exceeding 7%. The processed base material was specified to have a CBR of 80 or more, and 90% compaction, modified AASHO.

Asphalt Paving, Two Types

On the Island job, hot plant-mixed, machine-placed asphaltic concrete of 2-in. rolled thickness was low bid for the 229,000 sq. yd. involved. The mix consisted of a well-graded 1-in. max. stone 4% to 9% filler (passing 200-mesh), and 5% to 7% bitumen. Asphalt of 120-150 penetration was used, great care being given to obtaining a mix that would avoid bleeding in this warm southern climate.

For the 185,000 cu. yd. of runways on the Peninsula, Uvalde rock asphalt was low on alternate bid. The mix ran 6% to 9% asphalt, 91% to 94% limestone up to 2-in. size, plus 4% water. Moisture was added during

Putting the final touches on rock asphalt runway at Matagorda Peninsula. Hot-mix asphaltic concrete was used for runways of similar cross-section at the Island project a few miles to the north

At the Peninsula airport over 220 acres of berm was protected after seeding and sprinkling by discing in green hay cut from adjacent land. A disc outfit weighted with a sand box cross-disced the grass into the soil. Hay was harvested with modern farm equipment, carried to the field in specially built trailers, and spread by hand

unloading of rail cars to replace evaporation losses.

Concrete aprons on both projects and all taxiways were built of concrete to 9-6-9 cross section, designed for medium weight planes.

Drainage a Difficult Problem

On both these low-lying projects the engineers practically had to "make water run uphill" to get adequate storm drainage. The graded elevation on the Island field ranges from 2 to 8 ft. above tide.

The problem was to provide the enormous storage capacity necessary to collect water from heavy sub-tropical storms and move it across a mile-wide field in minimum time. Several criteria were used in determining probable maximum run-off, including rainfall intensity-frequency data from David C. Yarnell of the U. S. Dept. of Agriculture. The U. S. Engineers' policy is to use 2-year frequency maximum for temporary and 5-year for permanent airfields.

At the Island airport the original 1942 runways, flanking the current extension work were drained by flat concrete box culverts, 48 in. wide by 18 in. high. Heavy rains occurring before a good turf could be developed filled portions of these drains with sand. In spite of pumping out the drains still were not functioning with entire success. In studying various drainage schemes the engineers noticed that storm water would run off readily along any slope exceeding 1%, but flatter areas would retain water due to difficulty of grading and maintaining to a true surface free of depressions. Since installation of drains under the runways would necessitate a general raising of the design level of field about 4 ft. at considerable expense, it was decided to depend entirely on surface drainage, which in turn resulted in the design of a series of very wide, shallow mile-long "valley" drains having side slopes of about 1½% and axial gradients of .05% to .06%. Valleys at typical sections were built about 250 to 290 ft. wide and up to 4 ft. "deep" at the center. (See Fig. 2.) A great deal of study was given to these ditches, as it was desirable that the fields be made serviceable as soon as possible after storms, and for the well-known fact that even a 2-in. sheet of water standing on a runway may wreck a fast plane during landing.

In effect the entire field area between runways was contoured to function as a ditch or series of roughly parallel ditches. Where the "valleys" cross taxiways, the pavements were made to dip in vertical curves conforming closely to the valley cross-section. Thus taxiways become temporarily inundated after rains. Taxiway pavements slope 0.5% transversely in direction of drainage.

The Peninsula field also depends largely on surface drainage lines paralleling runways, but accumulated surface drainage is carried under taxiways at four points by means of single or double lines of asbestos bonded corrugated metal arches varying in length from 535 to 1,100 ft. A typical valley consists of an area between two parallel runways 750 ft. apart (c.l. to c.l.). Actual valley width varies from 500 to 600 ft. The valley bottom slopes 1.7 ft. in 2,200 ft., or .077%. The area of approximately 55 acres drains into a double line of 44 x 26 corrugated metal arches which discharge under head into an open ditch.

Sod and Turf Development Important

Because of the fine blow sand, quickest possible development of pro-

(*Continued on page* 71)

Rock asphalt had a tendency to cling to the bucket

Moving sand dunes to obtain glide angle clearance

Rock asphalt was loaded into barges with a 2-yd. dragline aided by a dozer

Editorial

GET TOGETHER AND PUSH

SUPPOSE the worst happens and Congress goes home without acting on road matters. When it convenes again in November one of its foremost duties to the nation will be to clean up this legislation, no matter how pressing the over-all question of re-conversion. In this event during the autumn weeks ahead you can do your community and country a great service by becoming extremely vocal on highway needs. Time is of the essence, since months are sometimes required to work out details of road programs after funds are made available.

Write or personally see your congressmen and senators while they are home, and let them know how you stand. And speaking of where you stand, now is the time to bury the hatchet over personal differences and go along with any reasonably sound program that has a chance of early passage. Everyone will lose far more by further delay than by any differences between one fund allocation formula and another.

The executive committee of the American Association of State Highway Officials, speaking for the association's majority, is officially committed to H. R. 4915 but should probably be willing to go along with the Senate's dual formula. Western states under the Senate formula stand to get less in the urban category though slightly more in total.

One controversial point in H. R. 4915 is that it would give an unduly large sum to western states for urban use ($1,753,000 annually for Arizona, for example). Four or possibly five eastern state highway chiefs have stood out against this bill, creating an unprecedented situation within AASHO which heretofore has never had to stand other than unanimously on legislative matters.

Today most of the highway industry leaders would probably accede to either the House or the Senate bill or any workable combination. As these bills now read they are not the bills of any one interested agency but brain-children of congressional committees resulting from the judgment of committee members and facts brought out in hearings.

It will be interesting at this stage to take a look at the line-up of agencies recently for or against the much-discussed H. R. 4915. Those which have worked closely with the American Association of State Highway Officials on the efforts cumulating in H. R. 4915 include the American Automobile Association, United States Chamber of Commerce, National Council of Private Truck Operators, National Grange, Rural Letter Carriers, American Municipal Association, and the Associated General Contractors of America, Inc. Members of the U. S. Conference of Mayors also went along, and of course there were others.

In opposition for one reason or another were the American Farm Bureau Federation and the American Petroleum Industries Committee (although other groups within the petroleum industry were for it). Not definitely hostile but apparently dragging its feet was the Highway Users Conference.

The American Road Builders Association which has done so much to set a high goal for post-war legislation and develop and present the economic story, in recent weeks condemned the House bill for its failure to provide for a full 3-billion-dollar annual program.

The whole picture, of course ,is quite complex, since this is a big country, *but from here on the diverse elements of the highway industry and profession had better present a more united front. A worse fate is possible than a bill that doesn't quite suit everyone. There is the advocacy that highway legislation be lumped in with the whole national post-war conversion problem, and swallowed up in one big public works program along with rivers, harbors, reclamation, new sewage treatment plants and what have you.*

The basic difference of highways from other public works needs to be written in indelible ink. Road building isn't primarily a federal job, and never has been. Our splendid federal-aid highway system has flowered since 1916 under *state* direction, with federal-aid money allocated to states always on a clearly established basis of functional need. Not only are highways definitely self-liquidating investments when soundly conceived, but the federal aid they receive comes from funds taken from motorists and thereby returned to motorists. We mustn't forget that in 1941 the federal government taxed highway users $670,000,000 and returned only $200,000,000 of it to highway users in federal highway aid.

In asking for $500,000,000 or for $650,000,000 annually for the post-war program we are still on sound terra firma, fiscally speaking, and not "running to Washington for a federal handout."

▼

MORE STEAM IN THE DRAFTING ROOM

IF THE "go" signal should flash soon on the kind of a post-war highway program we have all been working toward, how near ready would we be to let a sizable volume of contracts?

Early in the year a survey by ARBA showed that the state highway departments would have around $1,300,000,000 in projects ready by January 1, 1945. This figure, though large, is none too high in view of the job to be done, whether we think primarily of making useful employment or of road needs.

Hence, there has been some concern over more recent figures released by Commissioner of Public Works MacDonald. He says that state highway departments

as of June 1 had completed construction plans for only $214,000,000 in projects. Another $932,000,000 in jobs were being designed, however, and $1,069,000,000 worth were reported under survey for working plans.

Just how many of the projects in the "being designed" category will be ready by the end of the year is not certain at the moment. But there is a growing anxiety over this general situation, which has turned into deep concern as the European phase of the war draws to a close.

Swift war events and hopes for early resumption of highway construction mean that every possible trick must be used to speed up plans preparation. In most instances the problem has not been one of funds. Two-thirds of the $60,000,000 earmarked from federal funds for this purpose has remained idle, many state departments preferring to wait and use their allotments for actual construction.

The big difficulty, technical man-power, is certain to ease as war plants are cut back and qualified men filter out of military service. Rebuilding design staffs should be the first order of the day.

We haven't used the term WPA here. But it's written in every line. In 1933 the construction industry was caught flat-footed, without blue prints. This country can't afford it again.

$650,000,000 Road Bill Introduced by Senator Hayden

AS THIS is written, soon after Labor Day, there is a possibility that Congress will act on a post-war highway program before its members go home to mend their fences. It is getting closer to the matter, as shown by the introduction on August 18 of Senate bill S. 2105 calling for $650,000,000 annually for three years.

Introduced by Senator Hayden of Arizona, long time friend of highways, this bill ups the amount $150,000,000 yearly over the much-debated and lately dormant H. R. 4915. Should the Senate act favorably, the fate of the program will then rest with the House, whose leaders have promised to definitely consider it when they reconvene in November.

The Hayden Post-War Highway Bill also differs in other rather important respects from the house bill. It would allocate 250 million annually to the federal-aid system, as against 225 million in the House bill; 200 million for farm-to-market roads, as against 125 million; and 200 million for urban highways, as compared with 150 million. The states would pay 40% instead of matching on a 50-50 basis, as with the House bill.

Rural road funds under the Hayden bill would be divided among the states on the familiar formula which gives equal weight to population, area and mileage of post roads; urban funds to be divided in ratio of population of cities of 5,000 or more (dual formula). The House bill would apportion ½ on population and ¼ on each of the other factors.

In reporting the bill, the Senate Committee on Post Offices and Post Roads stressed the urgent need for development of a highway program to overcome deficiencies in the road system and meet the nation's transportation requirements. Urging prompt action by Congress the Committee report brought out that in 1945 the legislatures of 44 states would be in session, and that "only if national policy is clearly established in this field, and the extent of federal aid clearly indicated, can the states make full progress in meeting the complex legal and financial engineering problems which must be solved in advance if the post-war problem is to be soundly planned."

Another stated purpose is to "encourage the continuance of competitive bidding on construction and major reconstruction projects under the private contract system."

Commenting on employment values, the report points out that the capacity of highway construction to provide useful jobs, both on the site and in supply industries, was demonstrated in pre-war years when about half of all public works were road improvement projects.

Some states would be unable to match federal-aid on a normal 50-50 basis because of dwindled revenues and extraordinary expenditures to rehabilitate roads neglected during the war. Hence, the proposed 60% federal contribution.

Although Senator Hayden has indicated that he will seek immediate action on his bill, there is no definite indication as to when this will be possible. Reconversion and surplus war property legislation now dominate the "hill" and just when the highway bill can be sandwiched in is highly problematical at this writing.

ON THIS MONTH'S COVER

The cover of this issue of R&S shows the modern paving outfit of James Julian, Wilmington, Del., who has one of four contracts totaling $2,500,000 and covering 15.8 miles of modern dual highway along U. S. 22, east of Harrisburg, Pa. An article highlighting the design and construction features is scheduled to appear in an early issue.

Highway Research Board Meets November 22-25, 1944, in Cincinnati

From Washington, D. C., comes announcement of the Twenty-fourth Annual Meeting of the Highway Research Board, to be held this year from November 22d through the 25th at the Netherland Plaza Hotel, Cincinnati, Ohio.

November 22d and 23d will be devoted to meetings of the various committees and departments. Several departments will have open sessions on the 23d for the presentation of papers and reports.

Sessions of the Board for the presentation and discussion of papers relating to highway finance, economics, design, materials, construction, maintenance, traffic and soils investigations will be held on Friday and Saturday, November 24th and 25th.

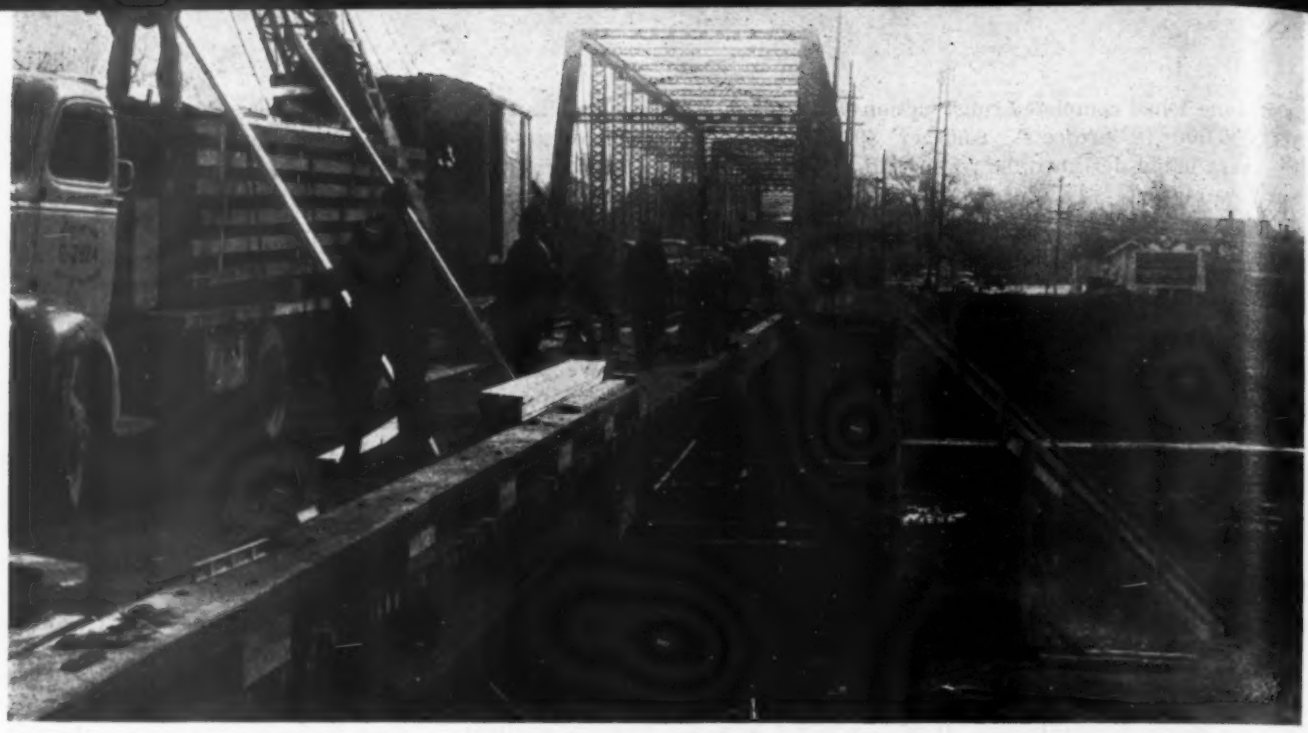
According to R. W. Crum, Director of the Board, it is expected that time and travel facilities will be greatly conserved by holding this meeting contiguous to that of the American Association of State Highway Officials which will be held the following week at the same hotel.

Airport Methods at Matagorda

(*Continued from page* 69)

tection against wind and water erosion was imperative on these projects. Topsoil was placed to a depth of 3 in. after blading the area to true contour, and 30 lb. per acre of Bermuda grass and cover crop seed was immediately sown and sprinklers kept coming up. Local pasture grass of good height was cut, loaded on large towing wagons by modern farm haying methods, spread on the field by hand, and disced in. A special discing outfit weighed with a sandbox proved helpful in "stubbling" the hay into the soil.

The Matagorda projects were designed and supervised by the Galveston district office of the U. S. Engineers under the Southwest Division (Dallas).



At Chillicothe, Ohio—finishing touches on three I-beam spans, rushed to replace wrecked 139-ft. truss. Span similar to spans still standing in background. Crane is unloading and handling floor and railing lumber

Photos by Ohio Dept. of Highway.

Fast Bridge Restoration Job Under Wartime Difficulties

Strategic bridge reopened in record time by Ohio State highway maintenance forces following wrecking of large truss span by a truck

By H. D. METCALF
Chief Engineer
Bureau of Maintenance
Ohio Department of Highways
Columbus

PLACE: *Scioto River Bridge at Chillicothe, Ohio.*

Event: 139-*ft. truss span* (1889) *buckled and dropped into river when hit by large loaded semi-trailer.*

Reason for concern: *An exciting and serious event in itself, to be sure, but made especially so since this structure was located on an arterial highway, which is part of the strategic network and was used daily by hundreds of vital war supply trucks, which were required to detour* 15 *miles at serious loss of time* (*and* $1,000 *extra daily cost in gas, oil, depreciation and tire wear.*)

What was done: *Wrecked span was removed from the site, all straight and sound members were salvaged for future use in other structures, broken and twisted members junked. A temporary* 3-*span bridge costing* $20,000 *was then built in eight days and nights, from the time that the first piling arrived at the job site.*

How it was accomplished: *The following details are indeed worthy of the sign that is displayed over the door of one of the Ohio State Highway Division offices: "At your service* 24 *hours a day,* 365 *days a year."*

To elaborate, the accident happened when a large semi-trailer side-swiped the end post of the span that subsequently went down, scraped along damaging all verticals until it hit the other end post. En route it hit an oncoming truck, but fortunately both got off the span before it buckled and dropped into the river (see photo).

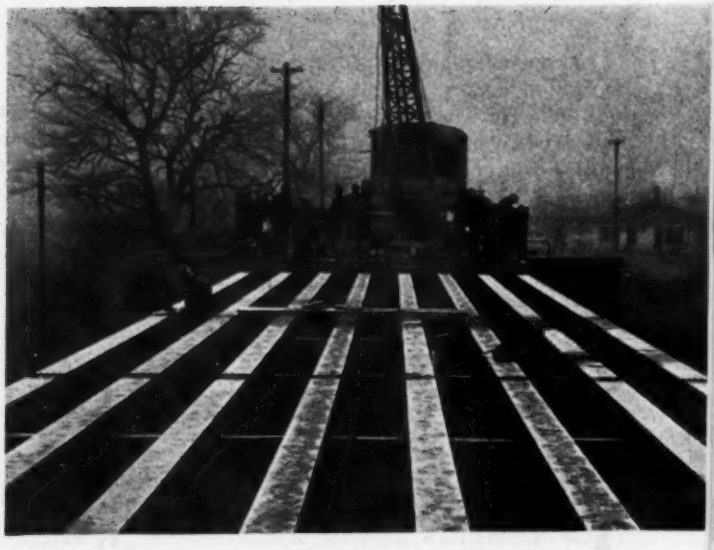
A fairly good two-mile passenger car detour was established, but the shortest detour route, having bridges strong enough to support heavy loads, added 15 miles to truck travel. A crew began the work of removing the wrecked span, with instructions to salvage as much as possible of the structural steel and strip floor for re-use on the job here or at other State bridges. While this work progressed, plans were completed for a temporary 3-span beam bridge on timber pile units.

It was seen that the cost and delay of detouring warranted pushing reconstruction with all possible speed and a search for necessary materials was begun. A test pile was driven during salvage operations, which indicated a need for 45-ft. piling.

Go-Ahead Signal January 7

Instructions to proceed with reconstruction of the wrecked portion of the bridge were given January 7 at Columbus. The decision was to use State forces, and to push the work with utmost vigor. On the same day, the 7th, an assistant to the chief engineer of maintenance, with full authority to direct the work, was sent to Chillicothe. He found that, of the principal materials required, only the strip flooring was on hand. The 50-ft. I-beams required had not arrived. Most serious, because they were needed first, creosoted piling had not been located. These were found in Toledo and shipped after a slight delay in securing long flat cars.

The truck that caused the accident careened onto the adjacent span, while the buckled truss crashed to the ground, a twisted mass



By daylight of the third construction day, the first span floor beams were ready for the floor

Pile driving was contracted and included cut off, capping and bracing.

At this stage it was possible to plan the prosecution of the work in detail. To save all possible time, a step-by-step sequence of timed operations was laid out under the policy of prefabricating as many members and parts as possible in advance and conducting various operations concurrently.

For example, while waiting for arrival of piling, time was gained by cutting I-beam sections for diaphragms and prefabrication of the 3 in. x 4 in. pieces of creosoted strip flooring material in 3-ft. sections. This work was done in a shop in the Division garage located not far from the bridge. A working platform made from I-beams leveled and with the spacing called for on the plans made it possible to nail up the strip floor in sections and to drill holes for clip bolts.

Meantime the piling shipment had been traced. Before these cars were spotted, a crane and truck-trailer were on their way to the siding to deliver the piling to the bridge site. The I's were also traced and expedited from shipping point to destination, and a crane and trailer-truck were waiting. When the beams reached the shop bench, angles to hold the diaphragm I's were welded to the web. The outside I-beams required the use of filler sections to hold the guard rail. These were short sections of I-beam welded to the web of the main beams and drilled to accommodate the rail posts. This work was also done in the Division shop. Thus, when the floor beams were set on the bents and abutments, only a few welds were required to get the welding operations ahead of the flooring operation.

Meanwhile a nearby transformer on a power line was tapped and a meter installed for night lighting and to run electric drills for boring timbers and tightening bolts.

Pile Driving Details

Thus when pile driving started on January 14 much sub-assembly work and prefabrication work had been started.

For pile driving, a 50-ft. crane, swinging leads and a 2,300-lb. hammer were used. By the evening of January 14 they completed driving the 13 piles required in the first bent, getting an 18-ft. penetration and 20-tons bearing per pile. The contractor's crew cut off, capped and braced the piles on January 15, the second day. Piles in the double bents were held in line by throwing two 12 in. x 12 in. oak timbers between the two lines to act as an inside template.

Setting the Deck

I-beams for the first span were set the second evening and a night shift of welders was put to work welding diaphram I's to floor beams. Two electric welding outfits were used. The crew consisted of two welders and four helpers, who placed the members and lined up the floor beams.

By daylight of the third day the welding had progressed beyond the center of this span and work was started on placing the floor. The prefabricated floor sections were placed with the aid of a crane and by nightfall the first span was floored and tight-bolted to the beams. During this operation diaphragm welding and flooring were being done concurrently. Driving of the piling for the second bent was started on January 17. The driving was harder, one pile breaking, which was replaced. However, the capping and bracing were completed on January 19, the sixth day. The floor beams were set for the two remaining spans by the evening of the same day, and again night welders worked on diaphragm I's so that on the morning of the 20th (7th day) the flooring of these two spans was started.

At this stage welding, flooring and wheel guard installation and bent bracing were all being done at the same time with no interference between gangs. By nightfall the flooring of these was completed. As each floor section was placed, bolts and clips were installed. A swinging scaffold was used from which five men placed floor clips.

Thus the whole bridge was floored by dark on the night of the 20th.

The finished job after subsequent painting—an example of the fast emergency work that is possible when complete authority is vested in one executive and detailed operations are planned in advance

Final or 8th Day

Placing and painting of the wheel guard and guard rail was done on the 21st. Here again several operations proceeded concurrently. Wheel guards, rail posts, and steel beam rail were being erected by different gangs while painting was being done on the completed rail. All the rail was erected and painted by 4:45 P. M. and the bridge opened to traffic. After opening to traffic a sidewalk was built.

The total cost of the job which included all labor, materials, contractor's services and equipment rental charges was $20,057.

This project is a refreshing example of accomplishment by State forces in time of war with the attendant difficulties in securing materials and skilled labor. The work was attacked with energy and enthusiasm. Credit should be given to all persons directly connected with the job including those who worked long hours without complaint to finish a fine piece of urgently needed work. When a job this size is built in eight days it means hard work, organization and planning.

Slide Makes 500,000 Cu. Yd. Clearing Job

. . . on Roosevelt Highway in Southern California

By WILLIAM F. AXTMAN
Asst. District Maintenance Engineer, California Division of Highways, Los Angeles

AT midnight, a time not unusual for highway maintenance men to be called out of bed, one of the largest highway slides ever to occur in the Southern California area slipped out of the adjacent hillside a few weeks ago and completely buried the Roosevelt Highway near Los Angeles.

The 80,000 cu. yd. of earth which fell that night, together with the 40,000 cu. yd. that followed in a series of smaller slides during the next 43 hours, covered the road full width for a distance of more than 500 ft and up to a depth of 70 ft. Although the highway in this location is graded to a width of 100 ft., so great a quantity of material fell that much of it continued down the slope of the slide and into the ocean.

Cracks Warned Officials in Time

Fortunately, this did not all happen without some warning. Cracks had developed in the hillside a few days prior to the incident, which indicated some movement was taking place. Watchmen were placed on duty day and night to safeguard traffic when it appeared a slide was impending, but one of such tremendous proportions was unexpected.

During the course of the slide removal work, many small slides occurred and movement was noted in an additional mass of earth estimated at 250,000 cu. yd. in the hillside above. It is therefore anticipated almost a half million cubic yards of material will be moved before the slope is stabilized.

There was no apparent cause of the slide but it was probably due to adverse jointing planes in an otherwise favorably bedded shale. An igneous intrusion forms the lower part of the cut slope, but the slide did not extend into this formation.

Some authorities were at first of the opinion that it was the result of a slight earthquake which had been felt during the night, but this theory was later disproved when investigation revealed the slide occurred about 4 hours prior to the time the earth tremors were recorded.

Showing bulldozers commencing to remove loosened material from steep hillside adjacent to highway

Blocked Strategic Artery

Roosevelt Highway, US 101 Alternate, is one of the major state highways along the Southern California Coast and carries a large portion of the north-south traffic. It is also of extreme military importance, at the present time, as it serves the traffic to and from Port Hueneme and the various other Southern California coastal and inland military establishments. Thousands of tons of war equipment, materials, and supplies are trucked over this road daily.

Detours over inland routes were available, but delays to essential wartime traffic are serious. Consequently, State Division of Highways Maintenance crews, under the direction of District Engineer S. V. Cortelyou and District Maintenance Engineer W. L. Fahey, immediately tackled the job of clearing this strategic highway. These crews, well trained for emergencies of this nature, but with their personnel drastically reduced by the manpower demands of the Army and Navy, dug into the monster slide and continued on a round-the-clock basis until a one-lane road was open. During the time the highway was closed,

Showing enormous slide that recently closed Roosevelt Highway, one of the most important routes in Southern California. 120,000 cu. yd. of earth and rock spread over the highway for 700 ft. covering it full width for most of that distance

traffic was detouring at points 17 miles northerly and 27 miles southerly from the slide as these were the most direct routes that would accommodate all types of traffic.

At the outset of the work there were discouraging delays because of the numerous small slides and the quantities of loosened material that continued to fall. The main break in the hillside was found to be about 400 ft. above the elevation of the road and 400 ft. back. Before crews and equipment could work with safety at highway grade to actually clear the road, it was necessary to remove thousands of yards of overburden. Four heavy bulldozers, working a shelf from the top down, performed this phase of the work; and then power shovels, one on each side of the slide, and working toward the center, commenced to remove the mass from the road. Later, a dragline supplemented the other equipment.

While the work of opening the road full width continued, traffic was accommodated without serious delay or interference on the two-lane road that had been previously graded around the outer edge of the slide.

▼

States Receive $654,000,000 from Gas Tax—The net receipts in 1943 by the states from the motor-fuel tax amounted to $654,855,000. The weighted average rate of the tax for the 48 states was 4.05 ct. per gallon.

No "Mild" Winters in Rochester, N. Y.

Although the climate isn't severe, this city's snow plowing and cindering force must be highly organized and heavily equipped because of frequent freezes, thaws and snowfalls

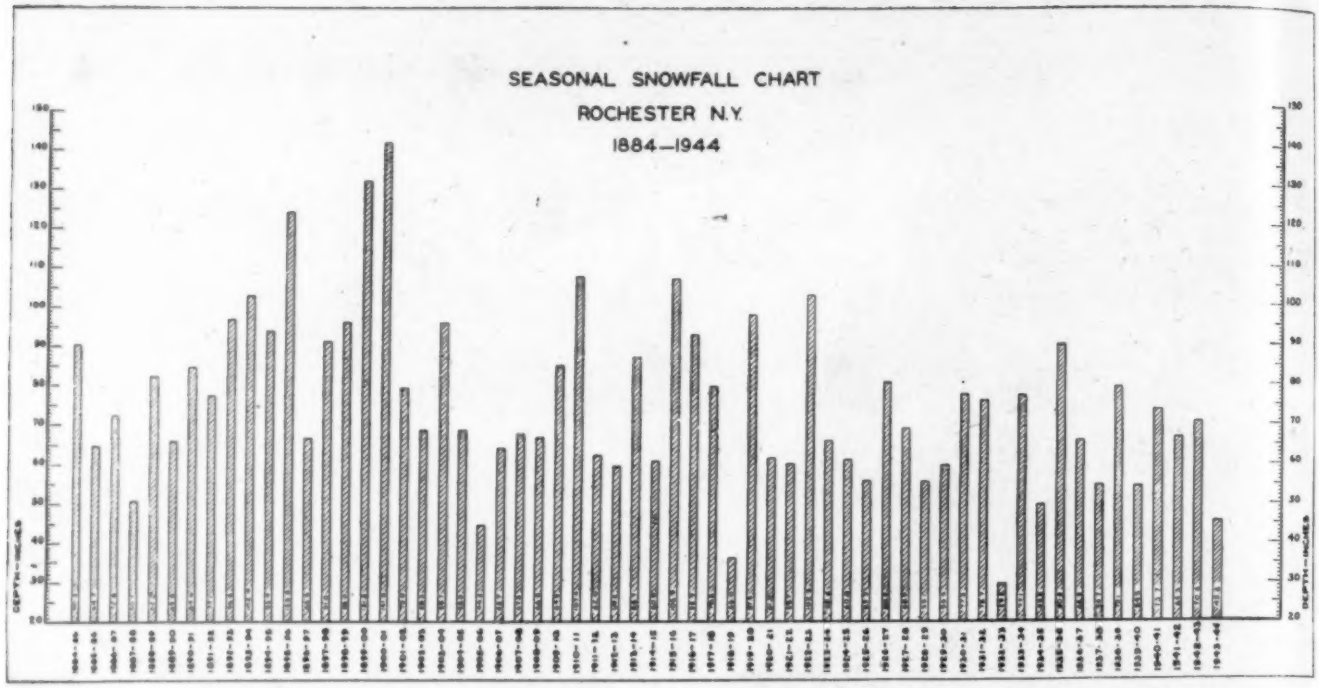
By AUGUST H. WAGENER,
Commissioner of Public Works, Rochester, N. Y.

LAST winter was a comparatively easy one on the city forces of Rochester, N. Y., which was a lucky fact considering the scarcity of labor. A good snow storm normally requires mobilizing at least 350 men including snow loaders to get streets opened up and carry out cindering operations quickly and adequately. There were times last winter when that many men simply couldn't have been found. As it was, we had 45.2 inches of snow during the 1943-44 winter, well under the long-time average 60 years of 75.58 inches and less than the 70, 66 and 73 inches of the three preceding winters.

Last winter a crew of 40 laborers was kept employed steadily on miscellaneous repair jobs, including some sewer work, in order to have them available for storm emergencies. Ordinarily, when labor is plentiful we depend on a call list of temporary workers to meet emergencies.

Snow Clearing Methods

The city's 520 miles of streets are divided into two dispatcher districts and further broken down into 90 plow routes. About one-third of the mileage consists of priority routes which take in the downtown district and all bus line streets and other arterials. The dispatcher stations, located one on each side of the river which splits the city, are manned 24 hours a day by a dispatcher who is in constant contact with an inspector assigned to watch for slipperiness conditions or signs of impending snowstorms. Two standby cinder trucks are kept at each station. When the inspector gives the word, these move into action and the call goes out for further cinder trucks and plows needed.



Plowing usually begins at about midnight after traffic has thinned out unless the storm's intensity requires getting started earlier. Truck plows are worked in tandem. As soon as a pair have worked around one route the dispatcher assigns the drivers to another from the route map in his office. During last winter's worst storm all routes were plowed successively three times in 48 hours of continuous operation. The city has about 100 one-way truck plows, and on any serious snowfall nearly all of them go out. When snow begins to drift badly or a heavy fall has accumulated on unopened streets or lanes, then heavier equipment comes into play. Four 10-ton all-wheel-drive snow fighters equipped with V's and wings, and two big special one-way plows on 7-10 ton trucks, are available for opening up heavy banks and for long arterial straightways of which the city has several.

The city also owns one blower unit and seven screw-type loaders. The blower is often needed on the municipal airport, while the loaders concentrate on the downtown area between midnight and 8 a. m., whenever possible. Their work is speeded greatly by the convenient location of the Genesee River through the heart of the business district. Loaded snow is dumped through openings in the decks of three bridges, thus eliminating several miles of haul and relieving trucks for sanding and plowing.

Cindering a Big-time Operation

About fifteen 2-ton trucks are kept busy on cindering. These are hand shoveled, using two men on a truck. In addition several 10-ton all-wheel-drive snow trucks equipped with spinners go up one side and down the other on arterials as needed. They spread about a mile per load.

Cindering, too, follows a priority system. First, the arterials and downtown, then intersections and stop sign locations.

In addition, as a service to pedestrians and for emergency use, salt boxes are spotted on the sidewalks near downtown intersections and shovels provided for emergency application of salt without abrasive. Traffic policemen usually place this salt when needed quickly.

Cinders are plentiful in Rochester. Graded cinders are stockpiled and the practice is to add about 25% salt by hand shovels as the clamshell loads. Ordinary C.C. salt is batched by shoveling from barrows of a capacity calibrated for a 2-ton cinder load.

The size of the cindering job required in Rochester is reflected in the fact that last winter 16,000 tons of salt was required. The 1942-3 winter took 20,000 tons, and the 1941-2 winter even more.

Keeping parking lanes and gutter lines open is a special job here as everywhere. Cars parked after hours are simply towed in and impounded so that the plows can come along. To keep ice cleared from gutters we have equipped three 10-ton trucks with center blades or ice cutters. Ice which forms in the middle of the street between traffic lanes is also loosened by these trucks and taken to the gutter by a sidewalk plow or power broom.

Equipment Maintenance

Overhauling snow trucks and the general mechanical get-ready job begins about Sept. 15 and is pushed intensively until Nov. 15, when the "season" is usually on. This work is done by the motor equipment division under the department of public works. The city was fortunate in having a good stock of parts and a fairly modern fleet when war began. Also in having its own well-equipped machine shop and motor overhauling facilities. There have been comparatively few mechanical delays.

In addition to 24-hour shop cooperation the motor equipment division also has an inspector and service trucks out making the rounds during plowing work.

One of the most important factors in getting a smooth functioning of winter work in a large city like Rochester is to see that all city departments are set to cooperate. This autumn, as in the past, all P.W. department heads will hold a series of conferences, so that mutual problems can be discussed and each department know definitely what part it is to play during storm emergency.

John V. Lewis is director of maintenance and operation, Dept. of Public Works, and Mr. John P. Hanoven is supervisor of maintenance and operations.

▼

Total new construction in the U. S. during the first half of 1944 was reported by ARBA at $1,874,000,000, a drop-off of 40% from the last half of 1943. Estimate of 1944 highway construction is $290,000,000, a decline of 30% from 1943.

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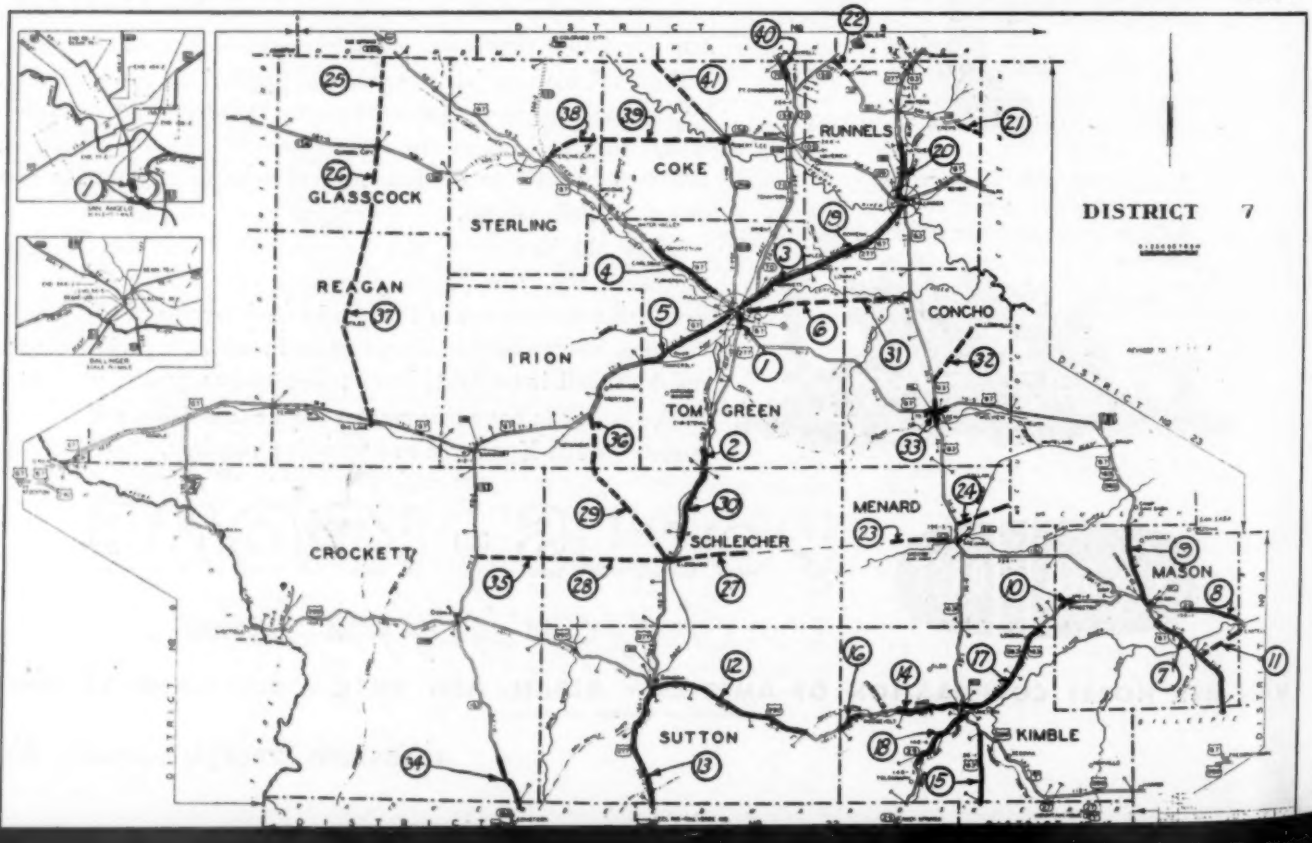
AN AFFILIATE OF DRESSER INDUSTRIES

District Has $1,571,000 "Plans Ready"

FROM A. F. MOURSUND, district engineer, Texas highway department at San Angelo, comes this summary showing how extensively the state is planning to fix up roads out in the cattle country after the war, and how well along they are with advance engineering. Out of $6,277,000 in projects proposed, $1,571,000 are in the "surveys and plans 100% done" stage.

Description, approx. estimated cost and % completion of construction plans and surveys as of July, 1944

1. Two new bridges, 0.3 mi., $252,000 (100%).
2. Bridge and approaches, 0.4 mi., $45,000 (100%).
3. Widen pavement and structures and new creek structure, 16.4 mi., $191,000 (100%).
4. Widen base, asphalt surface, 5 large structures, 9.7 mi., $80,000 (0%).
5. Widen base, asphalt surface, large structures, 16 mi., $260,000 (0%).
6. Grade and d. s., flex. base and asph. surface (farm market), 18.4 mi., $200,000 (50%).
7. Reconstruction of grading, base asph. surface and structures, 19.0 mi., $440,000 (100%).
8. Grading, structures, base and asphalt surface, 8.8 mi., $207,000 (100%).
9. Reconstruction, 14.5 mi., $217,500 (75%).
10. Large structure, $36,000 (Preliminary investigation 100%).
11. Grading and d.s., flex. base and asph. surface (proposed farm-market hwy.), 9.5 mi., $75,000 (0%).
12. Reconst. and reloc., 27 mi., $540,000 (90%).
13. Reconstruct. & reloc., 21.0 mi., $450,000 (75%).
14. Relocation to eliminate 2 low water crossings, $100,000 (100%).
15. Grading, d.s., base & asphalt surface, 10 mi., $210,000 (100%).
16. Reconstruction, 7.0 mi., $85,000 (0%).
17. Four large structures, 0.4 mi., $172,000 (Prelim. investigation 100%).
18. Three large structures, $80,000 (0%).
19. Widen pavement & structures, 14.3 mil., $100,000 (10% surveyed).
20. Widen pavement & structures, 9.3 mi., $127,500 (50%).
21. Grading, d.s., flex. base & asphalt surface, farm-market hwy., 4.5 mi., $50,000 (0%).
22. Grading, d.s., flex. base and asphalt surface, FM hwy., 3 mi., $67,000 (100%).
23. Grading, d.s., flex. base & asphalt surface, FM hwy., 5.5 mi., $103,000 (100%).
24. Grading, d.s., flex. base & asphalt surface, proposed FM hwy., 13. mi., $100,000 (0%).
25. Grading, d.s., flex. base & asp. surface on FM hwy., 15.5 mi., $100,000 (0%).
26. Grading, d.s., flex. base & asph. surface, proposed FM hwy., 15 mi., $100,000 (0%).
27. Grading, d.s., flex. base & asph. surface, FM hwy., 10 mi., $100,000 (25%).
28. Grade, d.s., flex. base & asph. surface, proposed FM hwy., 21 mi., $150,000 (0%).
29. Grade & d.s., flex. base & asph. surface, proposed FM hwy., 19½ mi., $150,000 (0%).
30. Widen structures, several miles, $25,000 (under const.).
31. G. & d.s., flex. base & asph. surface on FM hwy., 12 mi., $175,000 (50%).
32. G. & d.s., flex. base & asphalt surf., FM hwy., 14 mi., $90,000 (0%).
33. Widen pavement, 2.1 mi., $98,000 (0%).
34. G. & d.s., flex. base & asph. surface, 10 mi., $75,000 (0%).
35. G. & d.s., flex base & asph. surface, 12½ mi., $75,000 (0%).
36. G. & d.s., flex. base & asph. surface on FM hwy., 11 mi., $100,000 (0%).
37. G. & d.s., flex. base & asph. surface, proposed FM hwy., 33½ mi. $250,000 (0%).
38. G. & d.s., flex. base & asph. surface, 13.0 mi., $125,000 (location made).
39. G. & d.s., flex. base & asph. surface, 21 mi., $250,000 (loc. made).
40. Bridge and approaches, State Hwy. 70, 12 miles north of Bronte, 0.6 mi., $60,000 (50%).
41. G. & d.s., flex. base & asph., 12.7 mi., $166,000 (50%).



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Soil Anchors Simplify Bearing Tests

Wartime construction of military airfields has made it necessary to have available complete soil bearing information in order that the most economical pavement design consistent with the plane load requirements might be utilized. This procedure saves time, labor, and equipment

By IVAN F. SCHNEIDER and F. J. HOGEN
U. S. Engineer District Office, Detroit

THE usual tests for securing soil information for air field construction require the use of heavy and cumbersome equipment. Frequently it was found that soil, weather, and other conditions were not favorable for the manipulation of such equipment. To overcome these difficulties, the Detroit District, Corps of Engineers, designed and built a new outfit for obtaining soil bearing values. The unit was portable enough to travel the highways and sufficiently flexible to meet a wide range of field conditions.

Loaded Trucks Eliminated

In the new unit, the clumsy and costly use of loaded trucks to obtain the reaction to the jack loads was eliminated. As a substitute, standard telephone pole type soil anchors were adopted and proved to be entirely satisfactory. (Photo No. 1.) Each of these anchors consisted of a 10-in. diam. split disc attached to the threaded end of 1¼-in. solid steel shank 7½ ft. long. The disc was attached with a steel casting or forging with stub-pointed lead, threaded into the shank. In addition, two rivet pins were used to further hold the disc forging to the shank. The collar was also brazed to the shank. This extra provision was important since, in some soils, the anchors are subjected to great strain. The anchors must also be removed after each test for further use.

The anchors were started into the ground by digging or drilling a shallow hole with post hole auger. Two large heavy-duty pipe wrenches at least 3 ft. long with 3-ft. pipe handle extensions are employed in turn-style fashion to sink the anchors. This operation requires from two to six men, depending upon the soil conditions. Four anchors screwed to depths between 4 and 5½ ft. are usually sufficient. Provision is made in the design of the equipment for the use of six or eight anchors.

In more than fifty tests made during 1943, four anchors were the maximum used in any set-up. The anchors will each hold from 2,000 to 12,000 lb. pull in mineral soils. To develop maximum anchorage, it is imperative that the apparatus be set up to distribute evenly the uplifting forces of all the anchors. Good results have been obtained by using a light wood template to lay out the anchor holes with respect to the center of the bearing plate. This simple expedient insures correct and symmetrical alignment of all parts, and contributes to the speed of assembly, especially when inexperienced labor is employed.

No. 1—Telephone pole type soil anchors, used in place of loaded trucks as a means of reaction against test load pressures applied on soil bearing plates

How Load Is Applied

Preparatory to applying the load, a 30-ton hydraulic jack with 50% overload capacity was centered on a 30-in. diam. steel bearing plate properly seated and leveled. This jack had an attached pressure gauge which calibrated to register applied loads in lb. per sq. in. The jack ram was then pumped against a 10 by 10-in. by 12-ft. heavy-duty H-beam weighing 89 lb. per ft. The H-beam was indirectly attached to the soil anchors at its extremities through 1⅛ in. U-bolts connected to 6-in. channel iron spanners 5′ 7″ long, which are secured in pairs, back to back, to the shanks of the soil anchors. The end soil anchors were spaced about 3½ ft. apart when two were used. The channel iron spanners, however, were fabricated long enough to take care of the connections to three or four anchors at each end. The spacing between anchors may be cut down if more than two are used in line.

The cross channels, the H-beam and the bearing plate were all leveled and centered before any presure was applied. In the event that all soil anchors, due to obstructions, could not be screwed down to the same level, small vice-type clamps were attached to the protruding anchor shanks with four ¾-in. bolts. The clamps were then adjusted to maintain the cross channels at the proper level.

Two dial gauges, sensitive to .001 in., were used to measure plate deflections. The gauges were attached with adjustable clamps to steel joist spanners, 8 in. deep and 20 ft. long. Standard light joists were welded together to make up the desired length. The joists span the plate at right angles to the H-beam and are arranged in such a manner as to place the dial gauges in contact with the plate at diametrically opposed positions. When the bearing plate test was run on "off-pavement" areas, the ends of the joists were clamped to supporting stakes driven solidly into the ground.

Photo No. 2 shows general assembly of equipment when testing sub-

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The simplicity of the Vickers Hydraulic Power Steering System is evident from the typical application shown below. The System consists primarily of an engine-driven hydraulic pump, a pressure overload safety valve and the booster unit.

The booster is essentially a double acting hydraulic jack with integral control valve which instantaneously responds to the slightest steering wheel movement . . . directing oil under pressure to the booster cylinder and producing linear movement of the attached drag link. The steering effort is not transmitted through the steering gear.

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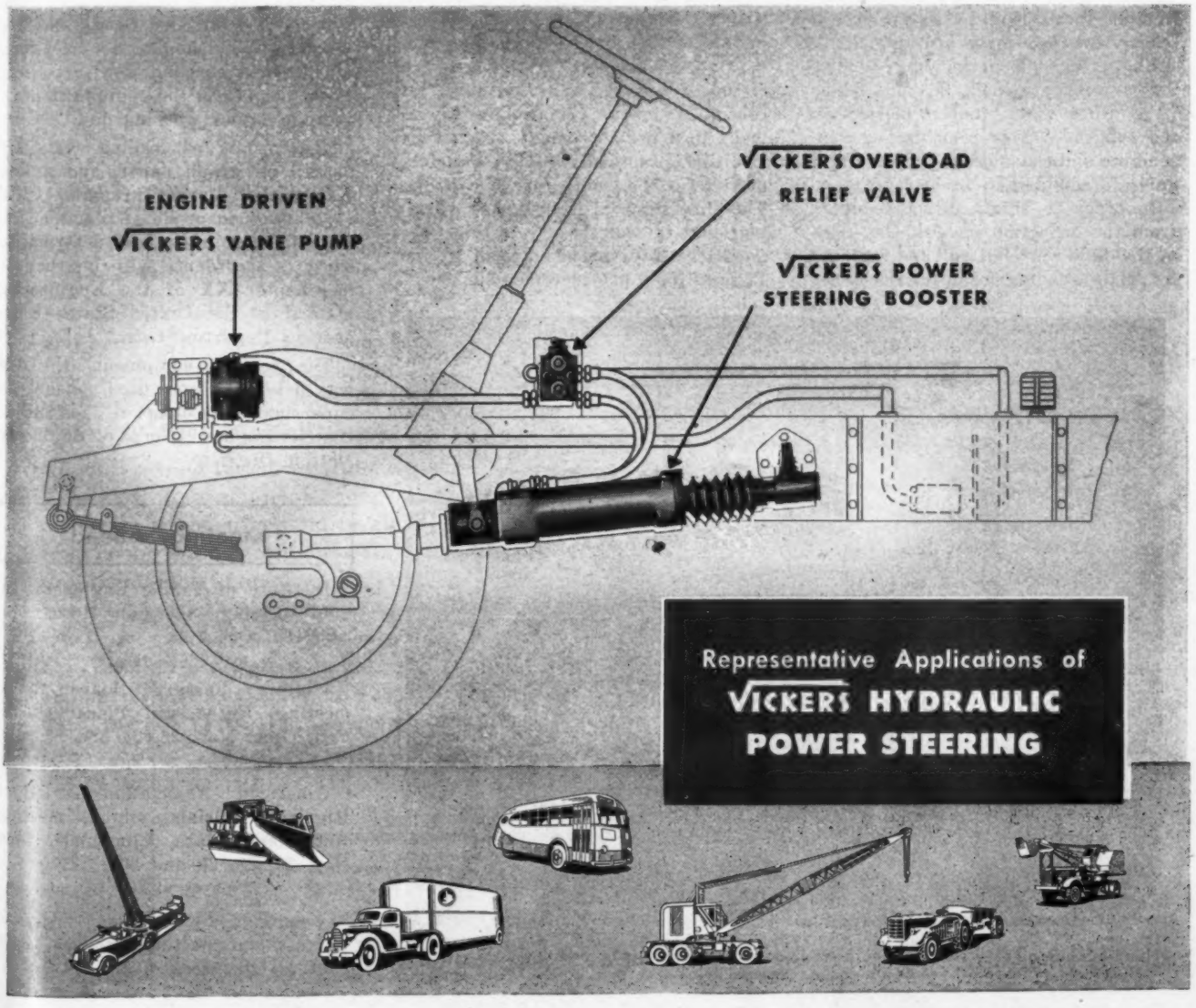
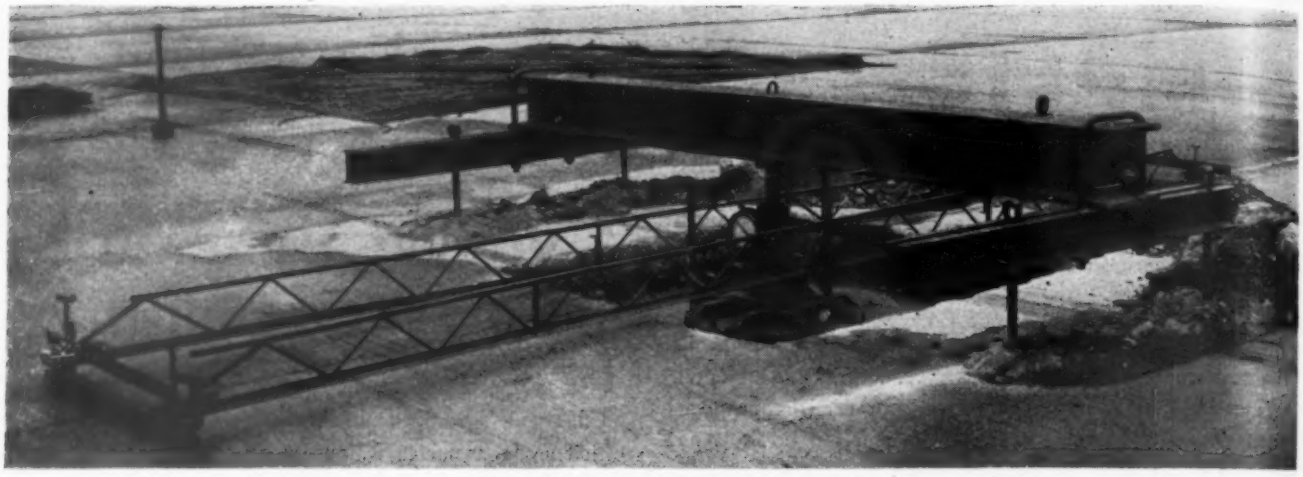




No. 2—Assembly of testing equipment

grade supporting value through openings cut into a concrete slab. The manner of securing the blocked-up ends of the spanner joints is also illustrated. In this instance clamps are attached to light angle iron spreaders holding the joists upright and rigid. Steel filler or shim plates and a steel ball bearing (2 in. diam.) were inserted between the head of the jack ram and the H-beam to prevent eccentricity when the loads are applied.

Photo No. 3 is a close-up showing the reinforced steel bearing plate (2½" thick x 30" diam.) bedded on the subgrade after removing a 6-in. concrete slab; also details of jack and gauge assemblies.

In order to obtain direct readings from the deflection gauges, the faces of the dials were "lifted" and replaced by dials reading counter-clockwise, which was the direction the indicator moves since the standard gauges are used in a mechanically reversed position.

Preliminary "Bedding" Load

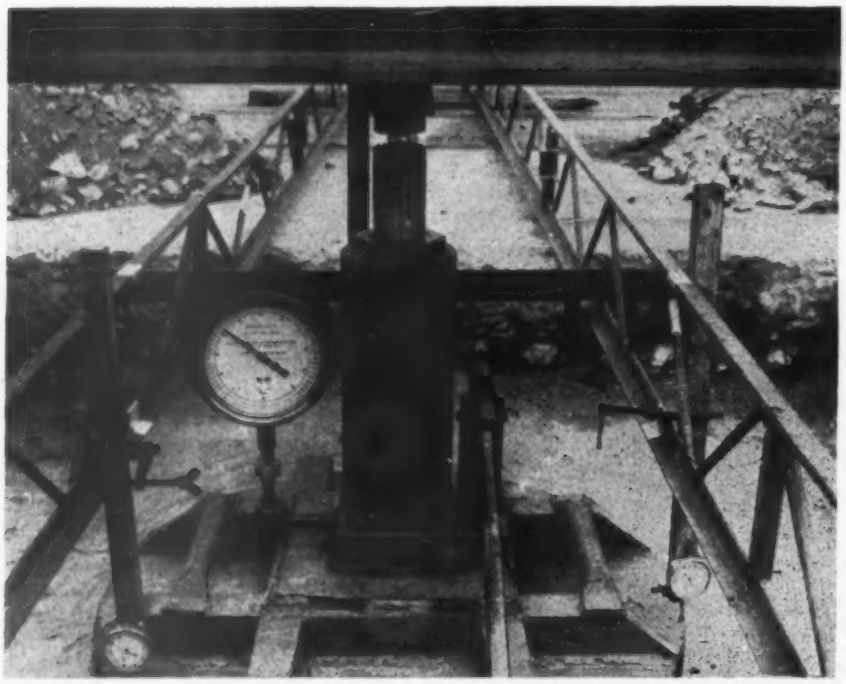
In conducting the test, a preliminary plate "bedding" load of 5 psi. is usually applied. When very poor supporting soils are encountered, a lighter bedding load is used. After release of the initial load and completion of the rebound, the gauges are re-set to zero readings and the test continued by applying the vertical loads in 2 psi. increments, each time awaiting practically complete deformation for the load before continuing. The time interval is obviously variable, but it was observed that the period usually varied between 10 and 15 min. for 2 psi. increments.

A 1½-ton truck equipped with a wood frame derrick and hand operated winch, will handle this equipment efficiently and provide room for storage of anchors, accessories, tool box, and the required additional soil sampling equipment.

Six men (four inexperienced laborers, one soil technician and an assistant) can move in on a job, set up the equipment, run the test, take the necessary soil samples for moisture, density, and consolidation tests, tear down and reload the equipment in an average 8-hour working day.

The results of loading tests are plotted on graph paper, and a load deformation curve prepared. The modulus of subgrade of reaction, Ku, is obtained from the load deformation curve in accordance with instructions in Chapter XX of the Engineering Manual of the United States Engineering Department.

The testing equipment described was developed and used under the supervision of Colonel Allison Miller, District Engineer, Corps of Engineers, Detroit District.



No. 3—Showing heavy steel bearing plate bedded on the subgrade, and details of jack and gauge assemblies

Meetings Ahead

Institute of Traffic Engineers, annual meeting, Sherman Hotel, Chicago, Ill., Oct. 1-4.

* * *

Highway Research Board, annual meeting, Netherland Plaza, Cincinnati, Ohio, Nov. 23, 24 and 25.

* * *

American Association of State Highway Officials, annual meeting, Netherland Plaza, Cincinnati, Ohio, Nov. 27, 28, 29 and 30.

* * *

American Road Builders Association, annual meeting, Stevens Hotel, Chicago, Ill., week of Jan. 14.

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HOW IT WAS DONE

Labor and time saving job kinks and interesting construction features, noted by R & S editors in their travels or sent in by readers. Send in your suggestions with sketches or snapshots.

Lifts Joint Assembly with Gantry

Dowel joint assemblies complete with ¾-in. header, bar template and dummy rack, can add up to considerable weight on a 24-ft. paving job. On highway 183 between Dallas and Ft. Worth, Texas, last May, Austin Road Co. employed a homemade gantry or bridge which quickly picked up a joint assembly and moved it to position ahead of the paver. The gantry rides the forms on flanged wheels, salvaged from some scrapped unit. Large wheels at either end turns shafts over which lifting chains wind to lift or lower the joint assembly and pick up the guide frame. (Photos below and right.)

▼

Arch Concreted by Ready-Mix Truck Loaded by Belt Conveyor

On the U. S. 22 access road job east of Harrisburg, Pa., recently a large culvert arch was poured without benefit of a stationary mixer by spotting a truck-mixer alongside the job. Batched sand and gravel were hauled dry to the job and cement added as materials were fed into the truck mixer via the portable belt loader shown herewith. Union Construction Co. of Passaic, N. J., was the contractor.

▼

"Leaf Raking" in Reverse This Year

Leaf raking, a sneer word back in WPA days, is a serious matter of concern this autumn due to the help shortage. In some cities hand shovel gangs will scoop summer refuse and leaf accumulations into trucks as

usual. In others you'll see more and more ingenuity shown in picking up trash mechanically. Leaf dozers consisting of 8 ft. wire-broom-equipped pushing aprons, mounted on small rubber-tired tractors, will feed the stuff to augur-type snow loaders, we learn from reports from two eastern cities. How will you be doing it?

▼

Pier Concreted from Monorail

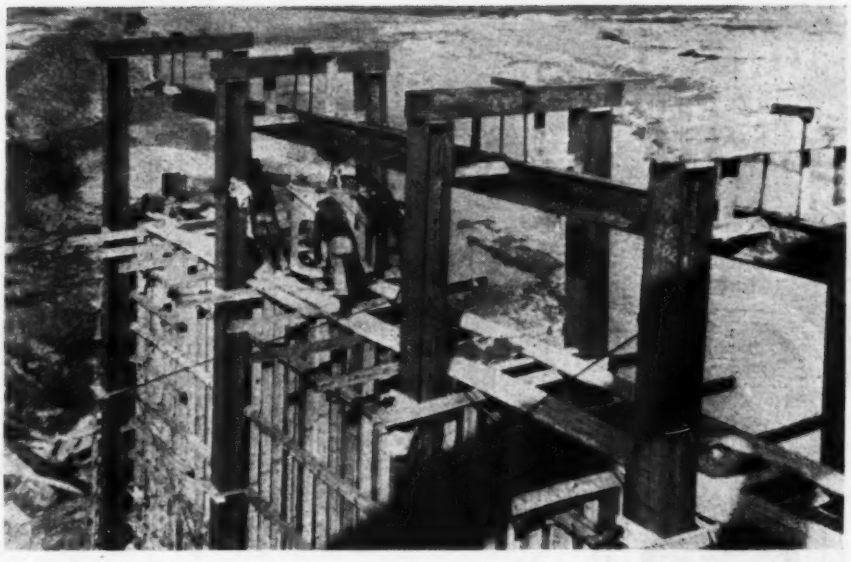
Piers for a bridge on U.S. 50 in Ohio [R. & S., July, 1944, project article] were concreted with minimum labor and mechanical equipment by means of the overhead rail arrangement shown in the photograph. A 1-yd. concrete bucket was suspended from this rail by means of a 4-wheel trolley which rode both sides of the lower flange. The H-rail, in turn, was suspended from 12 x 12 cross beams and braced as shown, and the load transmitted to the pier footing by H-beams which served the additional purpose of acting as very sturdy form supports. The H's were surplus from foundation piling stock. Two or three men handled and spotted the drop bucket and hand vibrated the concrete.

A crawler crane working on a construction trestle along the other end of the pier (behind camera) lifted the concrete bucket from the mixer below and swung it into position on the trolley hook. This arrangement permitted careful placement of concrete with little or no lateral flow and chance of segregation. J. and F. Harig Co., Cincinnati, was sub-contractor under De Salvo Construction Co., same city.

▼

Plate Girders Support Forms for Foot Bridge

On the Byrnes-Conway Co. contract last year, covering a 2.2-mile section of depressed arterial highway at Lockland and Arlington Heights (Cincinnati), Ohio, the contractor had the job of erecting a continuous concrete-slab overhead foot bridge of slender design. The bridge consisted of a 62-ft. center span over the roadway and 36½-ft. side spans.

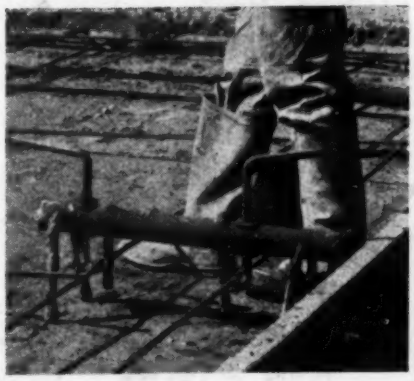


The problem of getting rigid support for the forms and yet maintaining a clear roadway beneath was solved for two of the spans by erecting two lines of steel girders (salvaged spans) as shown in the photo. Girders are carried by the left wall, a center falsework bent, and by a shallow bent on high ground back of the wall at the right. The steel girder panels were approx. 50 ft. each.

▼

Special Reinforcing Chair Used by Texas Contractor

The gimmick sitting on the subgrade beside the guy with the boots is a special bar chair, developed by W. D. Hyer, master mechanic for the Austin Road Company down in Texas. Used extensively by this large firm on road and street work (but not allowed by U. S. Engineers on airports), it takes the place of ordinary wire chairs left in place. You hang the reinforcing bars over a pair of bent suspension rods, and after concrete has enveloped the rods, just twist the handles and lift the chair away. Six chairs were used in two rows of three each on this job pictured, which is highway 183 between Dallas and Ft. Worth, a pre-war access road project resumed after long delay.



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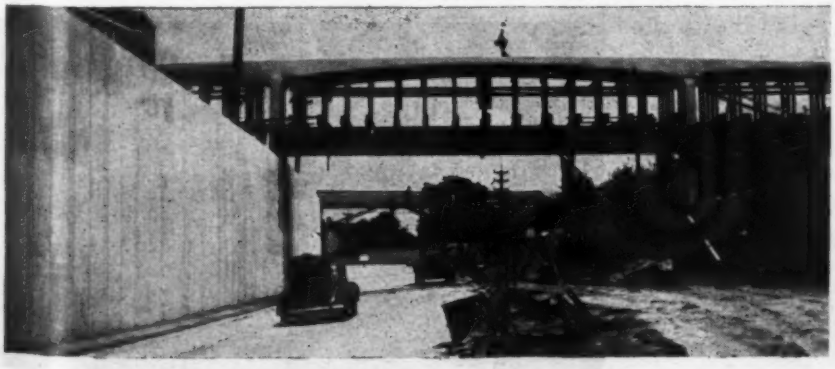
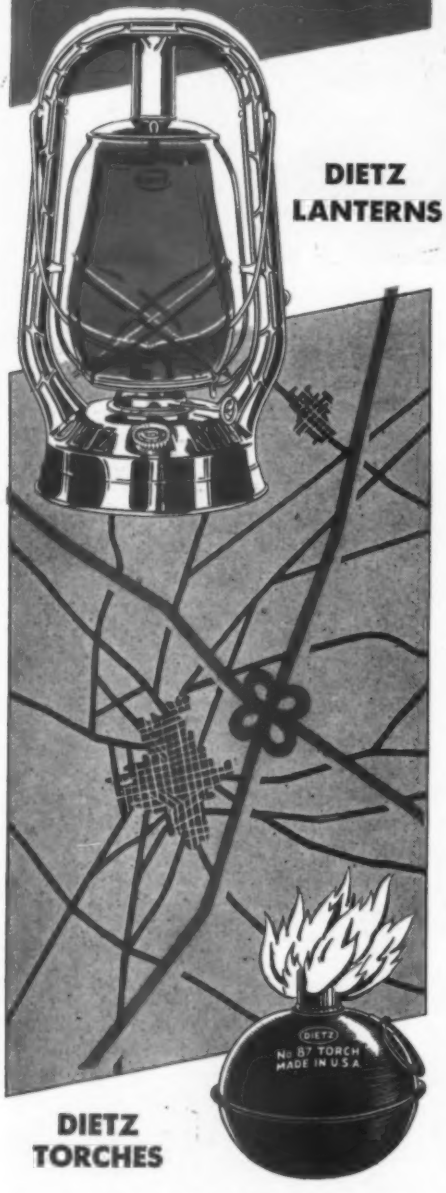


Wooden Pocket for Vibrator

When the vibrator nose is momentarily out of use, this wooden stall fastened by wire to the frame of the finishing machine, is a handy kink developed by the paving crew of A. I. Savin Const. Co., East Hartford, Conn. It's built of 2 x 6's. This photo was snapped on a recent airport apron job at Hartford.

FOR THE HIGHWAYS of TOMORROW



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Col. Sverdrup (left) with General Casey (next) and Major General Reybold, Chief of Engineers of the U. S. Army (right) in New Guinea

From the Scrap Book of an Army Engineer's Wife

MAKING up in color for what is lacking in scientific detail, are the accompanying snapshots taken by Col. L. J. Sverdrup of the consulting engineering firm, Sverdrup and Parcel, St. Louis, Mo., who recently has been in active charge of important Army engineering work in the South Seas.

Mr. Sverdrup left the continental United States in November, 1941, as consultant to the U. S. Engineers District Office in Honolulu on location and construction of a series of airdromes and their appurtenances, on a group of Southwest Pacific Islands and the East Coast of Australia known as the "First Ferry Route." This work was just getting under way when attack on Pearl Harbor occurred. From this point on he helped direct construction of the various installations, making use of such limited equipment as was available supplemented by native laborers.

In February, 1942, it was decided to establish an alternate ferry route between Hawaii and New Zealand-Australia following a line far east and south of the earlier route so as to avoid the critical danger zone, passing through the Fiji and Phoenix groups and on to Australia. Mr. Sverdrup assumed active charge of this work also, and later was commissioned Colonel of Engineers and assigned to General MacArthur's command in Australia. He has served there continuously since as Engineer Operations Officer under Major General Hugh J. Casey, Chief of Engineers for General MacArthur's forces.

In October, 1942, Colonel Sverdrup made a trip from Port Moresby to Buna over the Owen Stanley Mountain Range on foot and accompanied only by one Australian officer and native guides through territory Jap infested, and located the emergency air fields, the use of which played a large part in the conquest of this region. For this remarkable feat, he was awarded the Silver Star and later the Distinguished Service Medal.

During General Casey's absence from the area, Colonel Sverdrup has acted as Chief of Engineers to General MacArthur's command. He was awarded the Purple Heart for wounds received in the action at Finschafen.

Native labor toiled with primitive tools to build Army roads

Seek Uniform Labor Rates

The contractors of the several states, faced with a maze of regulations and labor difficulties, have joined in petitioning the Wage Adjustment Board for a revision of wage rates on a statewide basis. The first statewide schedule to receive approval was submitted by the contractors of South Dakota. Other states which have such proposals include Florida, Nebraska and Tennessee. In many states compliance with wage ceilings is practically impossible because of wide differentials in rates between federal and non-federal projects as well as irreconcilable rates of different areas within the state. It is said that the Wage Adjustment Board looks favorably upon plans for statewide stabilization of wages.

Meanwhile, reports from six Regional War Labor Boards on violations of wage stabilization policies show many and varied attempts to evade regulations, according to the National War Labor Board. Methods used by employers include granting unapproved wage increases, shift differentials, bonuses, stepping up merit increases, making unjustifiable promotions and operating a lottery. Although the full amount of the illegal wage payments may be disallowed as costs for such purposes as income taxes and payments under cost-plus contracts, disallowance of lesser amounts is found reasonable in some cases. Circumstances considered extenuating include an employer's efforts to prevent further violations and the existence of strong outside pressure for increased output under severe labor unrest.

▼

More Airports Needed

Studies regarding postwar airports made by the Civil Aeronautics Administration show that civil aviation will be seriously impeded unless the number of present airfields is doubled within five years after the war. The total number of airports in the country is 3,086. This includes those constructed under the 3-year program of C. A. A. costing $400,000,000. This resulted in 600 new or greatly improved airports, almost all of which will be used for civil aviation.

It will be necessary to double the number of airports and improvements should be made to 1,625 existing fields. Of the new fields proposed 2,900 will be small airports for personal flying and local air service. There are only 286 places in the U. S. where scheduled air lines can stop. The C. A. A. will recommend to Congress that 174 of these be improved.

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Fig. 1. The John C. Lodge Expressway, part of a proposed system of expressways which will help lift America's motor capital and 4th city out of its present cross-town congestion

The John C. Lodge Expressway, Detroit

Continuing a series of articles in which "Roads and Streets" is presenting a preview of things to come in America's congestion ridden cities. Watch for future articles

By LEROY C. SMITH
County Highway Engineer, Wayne County, Detroit, Michigan

THIS proposed expressway is one of the major projects of the Board of Wayne County Road Commissioner's post-war program.

Named after an outstanding official of the City of Detroit, a former Mayor, and now President of the Common Council and member of the Board of Supervisors of Wayne County with many years of distinguished public service to his credit, it has been selected as the Board's No. 1 improvement.

The project as planned is about 11 miles in length. It will run northerly and westerly from its intersection with the proposed River Front Drive in the central business district of Detroit (See Fig. 1).

Initial Plan; 3 Proposed Types of Construction

The width of the paved roadways provides for three 12-ft. traffic lanes in each direction, separated by a central median. Wherever traffic enters or leaves the expressway, an extra lane of sufficient length is to be provided on each side to permit traffic to accelerate or decelerate and to weave into or out of the high-speed traffic.

Three types of construction are proposed in the initial plan—elevated, depressed, and at grade; the particular type for each section being determined after full consideration of all the controlling conditions.

Where the expressway is to be elevated it will be on structure rather than on fill in order to preserve the ground surface for other uses and to maintain cross streets, many of which would necessarily be closed by any other type of construction (See Fig. 2). This is particularly important in the downtown section of Detroit, and where the route cuts diagonally across both the north-south and east-west streets in the southwest corner of the City of Highland Park.

An elevated structure has a great advantage in the downtown area of Detroit, in that it avoids major interference with a complicated system of underground utilities and permits the use of a narrower and therefore less expensive right-of-way. The ground level area under the expressway remains available for whatever use may be best at any particular location. Thus, a large part of this area can be suitably developed to increase off-street parking facilities. In other locations, it is foreseen that this covered space might well be used for playgrounds.

Local Traffic at Ground Level

Provisions for local traffic at ground level alongside the expressway consist of one-way service drives, each having a 30 ft. pavement. In addition to serving local traffic and the property abutting the highways, these service drives are desirable wherever street closures are involved, to act as headers for such streets, and to serve the traffic using the ramps giving access to, or egress from, the expressway itself.

For a large section of the route conditions indicate the desirability and practicability of a depressed type expressway in a wide right-of-way of approximately 300 ft. This type can be given a park-like treatment (See Fig. 3); its more economical than elevated in right of ways of approximately the same width, and its entrance and exit ramps are more efficient and less expensive. The design of the depressed section of this project will follow a pattern of being fully depressed under bridges serving the cross streets, and where the distance between bridges is sufficient, this depression may be reduced to a minimum of approximately 3 or 4 ft. for comparatively long stretches.

We plan to make the elevated and the depressed development equally pleasing in appearance. The one requisite for esthetic treatment is the same in either case—an adequate width of right-of-way.

Double Structure Downtown

The downtown section of the Lodge Expressway, leading north from the Detroit River to Michigan Avenue, is designated as a double structure, each deck carrying traffic in only one direction. Since right and left turns are possible from either deck this permits the simplest possible connection from this north-south expressway to the River Drive, proposed as a similar double-deck expressway.

Right and left turns being possible from either deck, ramp construction is greatly simplified, it being possible for ramps from both decks to be taken off on one side, and a wide choice of ramp locations is possible (See Fig. 4).

Furthermore, less private property will be necessary for ramp facilities, and the double deck expressway can be developed on a minimum width of right-of-way through the downtown area where values are highest.

Fig. 2. Along heavily built-up areas elevated construction will be used, requiring minimum right of way

Territory having rural characteristics with infrequent cross streets make a development at ground level desirable and economical.

The length of the various types of expressway construction will be approximately:

(a) **Double deck Elevated Expressway**—includes the River Drive from the connection for the Hastings Expressway to Second Avenue, and thence extends northerly to Porter St...	1.4 mi.
(b) **Transition from Double Deck to Single Deck** — Northerly from Porter St. to Cherry St.	0.3 mi.
(c) **Single Deck Elevated Expressway**—	
(1) From Cherry St. northerly to Peterboro	0.5 mi.
(2) From Cortland northwesterly to Monica at Lynden.....	2.3 mi.
(d) **Depressed Expressway**—	
(1) From Peterboro northerly to the south limits of the Harper-McGraw Expressway interchange	1.3 mi.
(2) From north limits of Harper-McGraw interchange to Cortland	2.3 mi.
(e) **Harper-McGraw Interchange**..	0.3 mi.
(f) **Expressway at Ground Level**—with grade separations over cross streets approximately ½ mile apart from Monica at Lynden to Schoolcraft at Robson	2.6 mi.
Total	11.0 mi.

Design of Expressway Connections

Various expressways will connect with or feed into the John C. Lodge Expressway, such as the James Couzens Expressway which will be extended a mile southeasterly to join the Lodge Expressway.

The Davison Expressway, a mile and one-half of which has already been constructed, depressed type, through the City of Highland Park, will join and merge into the John C. Lodge Expressway near the present westerly terminal of the Davison Expressway. Thus, the John C. Lodge Expressway completes the westerly extension of Davison Expressway into Schoolcraft Highway at a point just beyond Grand River Avenue.

The Harper-McGraw Expressway, now named the Detroit Crosstown Motorway, which the Michigan State Highway Commissioner proposes to build as his No. 1 expressway for Detroit, concurrently with the construction of the John C. Lodge Expressway, will have full interchange with the John C. Lodge Expressway. The Detroit Crosstown Motorway will cross the City of Detroit east to west and merge with the Detroit Industrial Expressway at McGraw and Wyoming Avenues.

The Detroit Industrial Expressway is now completed from the Willow Run Bomber Plant of the Ford Motor Company easterly to Greenfield Road, and the remaining section from Greenfield to McGraw and Wyoming Avenues is now under construction. These two expressways, the Detroit Industrial Expressway and the Detroit Crosstown Motorway, will serve through highspeed traffic between the east and west boundary lines of Wayne County across the industrial district of Detroit; a total distance of approximately 40 miles.

Drainage a Problem

The drainage problem of the de-

Fig. 3. Depressed section, planned through less congested areas, will be landscaped. Grades will rise to within 3 or 4 ft. of ground surface on long stretches between over-crossings

pressed sections will be simplified by the proposed construction in Hamilton Avenue of a deep sewer project to the northerly limits of Detroit, concurrently with the John C. Lodge Expressway, one of the postwar sewer projects of the City of Detroit. The grades and sizes tentatively established for that sewer will adequately serve the needs of the Lodge Expressway. The wide right-of-way acquired for the expressway simplifies sewer location and the sewer construction eliminates pumping problems for the depressed highway.

In the event that this sewer is not built pumping installations at proper intervals will be constructed to raise the water collected in the depressed expressway to a point where it can flow back into city sewers without danger of the project becoming flooded by back pressures or otherwise.

Traffic Speeds to Be Doubled

The John C. Lodge Expressway is estimated to have a peak-hour capacity of close to 4,500 cars per hour in each direction. By its connection with the Davison Expressway, the James Couzens Expressway and Grand River Avenue it will serve the heavy traffic of the northwest sections; and through its interchange with the Detroit Crosstown Motorway it will pick up traffic from the west bound for Detroit's downtown business district.

Based on an easy driving speed of 40 m.p.h. on any expressway of this type, a thorough study indicates that the motorist will cut his driving time exactly in half as compared to present day highway facilities, and at higher speeds, particularly on the outer sections of this expressway, the elapsed time will be cut proportionately.

Importance of Bold Solution

This comprehensive post-war expressway project is a part of a system of planned expressways formulated to take care of the ever increasing industrial motor transportation in addition to the intensive use made of privately owned automobiles which was never more acute than it is today, and which will receive a great impetus following the close of hostilities. The John C. Lodge Expressway and its connecting expressways, when constructed, will permit of high speed travel, and will be a link in a chain of limited access highways which will be instrumental in keeping in existence industrial plants now spread county wide due to war activities, and will be one of the means of promoting industrial expansion which is expected to follow the transition from war to peacetime activities, resulting in development and populating of new territories.

Many irritating bottlenecks now existing will be eliminated by the construction of this network of expressways in the congested sections of the City of Detroit. Some of these expressways will pass through slum areas where the necessary right-of-way width can be secured at a fraction of the cost in other locations, and it is foreseen that there will be a definite tendency to rehabilitate such areas; while in other areas, opened up by the expressways, new homes will be built because of the fast travel and direct routes, particularly in those territories in which the county in the last few years has contributed a related system of water and sewer facilities.

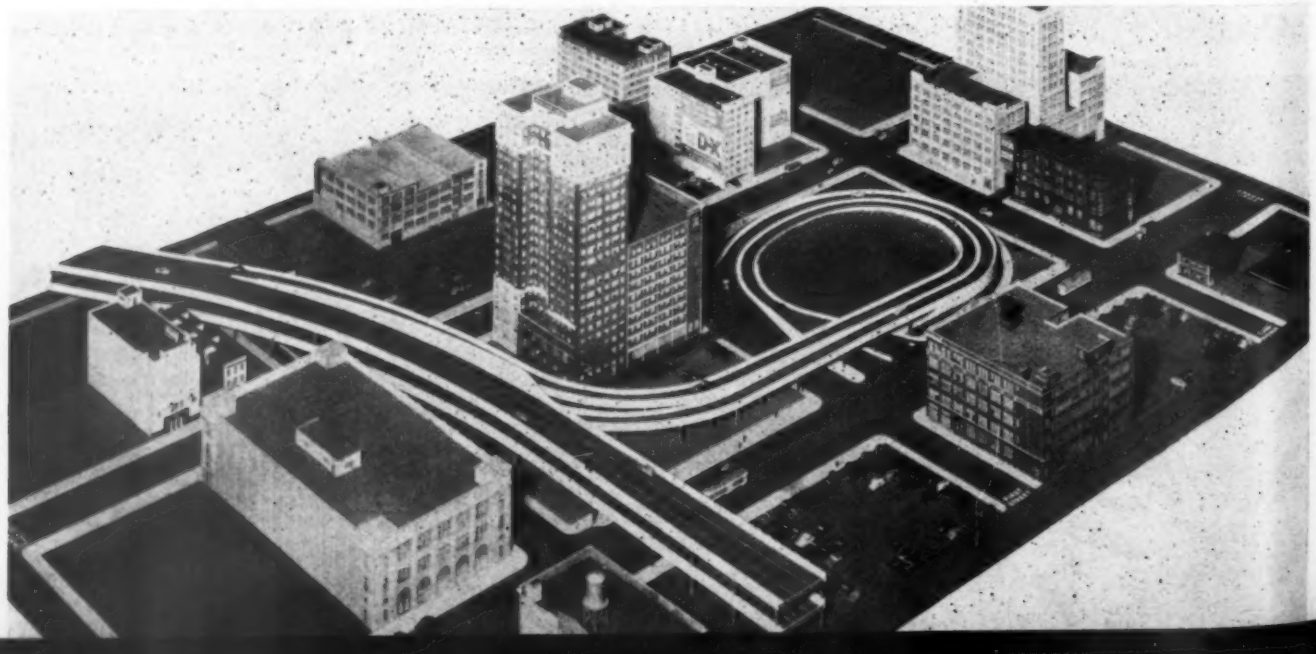
Patterned after the New York and Long Island System these expressways will serve the larger public recreational areas and facilities now being planned by the Huron-Clinton Metropolitan Authority for large scale patronage.

Public Works Planning Provided in George Bill

As this went to press, prompt passage was expected by the House of the Senate approved George Bill (S. 2051) which among other provisions authorizes appropriation of federal funds to assist in planning public works. To encourage states and other non-federal public agencies to make advance provision for public works construction, the bill authorizes the Federal Works Administrator to make loans on advances to states and their political subdivisions to aid in financing engineering and economic investigations, surveys, plans and specifications as well as other action preliminary to construction.

Although no specific sum is provided in the bill, funds appropriated for making of loans or advances are to be allotted by the Federal Works Administrator among the several states, 90% in ratio of population and 10% at FWA discretion. The allotment to any state shall aggregate not less than 0.5% of total funds. Another significant provision states that advance to any public agency shall be repaid if and when the construction of the public works so planned is undertaken. Since there will undoubtedly be subsequent legislation providing federal construction grants for such projects, it is believed that such advances will undoubtedly be applied against federal grants if and when forthcoming.

Fig. 4. Typical downtown construction—to be double-decked, with ramps leading from either deck



...and Not a Friend Kicked in the Teeth!

Judging from the advertisements, we seem to be one of the few factories that failed to win the War single-handed.

We did the best we could—***we increased our output of war materials 2000% over normal peacetime production, and we were voluntarily handing back our excess profits to the government before re-negotiation ever went into effect***—but, to be perfectly honest about it, we were so badly scared after Pearl Harbor that we would have promised to do twice as much with no profit at all if it would only help keep our country from going down in the shambles with the rest of the world. In other words: "When the Devil was sick, a Saint was he."

We did make one war-time record though, of which we're genuinely proud:

NOT ONCE DID WE EVER USE THE WAR AS AN EXCUSE TO DODGE A COMMERCIAL ORDER, AS AN EXCUSE FOR ROTTEN SERVICE, FOR SHODDY CONSTRUCTION, OR FOR ARROGANCE.

The Job We Did...

We ***fulfilled every single commercial order*** offered to us for which materials were legally available. We ***tackled every single repair job*** that anybody asked us to undertake. And, in spite of all the headaches involved, we managed to make pretty decent deliveries, and to keep the quality of workmanship up as high as was humanly possible to produce.

It sounds a little screwy for a Manufacturer to brag about doing the very thing a Manufacturer is supposed to do: Take better care of his Customers than any competitor possibly could. But it's not as easy as it sounds. In a war-order-gorged-plant it's a mighty temptation to use the war as an excuse to keep from "bothering" with a commercial order. The paper work alone involved in the appeals to Limitation orders, priorities, official correspondence, etc., is enough to make a factory want to duck the transaction. After the paper work has been ploughed through, the next job is to plead, threaten and curse to get in materials from our sources of supply. Then, all the Production Manager has to do is sweat blood to dig up enough man-power to get the work out some way ***without interferring with War contracts.***

And handling ***repair work*** under War conditions is a very special headache that should be reserved only for the most stubborn cases in Purgatory. Yet, we have completed job after job of repair work on equipment which the operator had purchased from our competitors. Incidentally we have never increased even by a fraction of a percent the normal peacetime profit on repair work.

The Seller's Obligation...

Our philosophy about ***taking care of commercial customers in War-time*** has been simple: Color and flavor the story any way you will, the inescapable ***fact remains that a Manufacturer lives off his Customers.*** No customers; no factory—and Lord help the Manufacturer who forgets it. If you want customers when the going is tough, you'd better take care of those customers when ***they*** have troubles.

If ever a corporation had reason to be grateful to its customers, Standard Steel Works has. We might not have weathered the depression years had it not been for staunch Customer-Friends who stood by us. And grand Customer-Friends of more recent years helped us to win national recognition in our manufacturing fields.

So, to us, these war years have been a golden opportunity to repay ***friends that we needed before the War—and that we are going to need more than ever after this War is over.*** If we say it ourselves, no Manufacturer ever tried harder under more difficult circumstances to pay his obligations in full.

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Weather Cycles Caused by Planet X

By HALBERT P. GILLETTE

EVERY planet, except far-distant, little Pluto, causes a noteworthy weather cycle whose length is that of its orbital period. One singular fact is that the rainfall peak of each of these cycles occurs when the planet is either in longitude 289 or 109 degrees. In the case of the earth this is either July 12 in regions where the annual peak is in the summer, or January 9 where it is in the winter. But the annual peak in daily sunspot numbers is July 12, with a 50-year average of 53 spots, whereas for January 9 the average is 34 spots. Another singular fact is that there tends to be secondary rainfall peaks and valleys causing subcycles whose lengths are 1/6, 1/18 and 1/54 the length of the orbital period of each planet. In the case of the earth these subcycles have lengths of 2 months, 20.3 days and 6.76 days.

Upon finding these planet subcycles it occurred to me that the harmonic cycles of 67, 22 1/3 and 7 4/9 years in the ring thickness of California sequoias ("big-trees") might be subcycles due to a planet whose orbital period is 6x67 or 402 years. I have found good evidence that this is the case. Sequoia rings indicate a rainfall maximum or peak of this 402-year cycle in A.D. 1682. By analogy, it follows that this 402-year planet X was in heliocentric longitude 289 degrees at the rainfall peak in 1682.

In 1909 William H. Pickering (Harvard Annals, vol. 61, pages 113-162) inferred the existence of a planet whose orbital period is about 374 years. He said it perturbed Uranus about every 107 years, causing it to run ahead of its calculated longitude about A.D. 1710, 1816 and 1922, the last named date being one that he published in 1931 (Popular Astronomy, vol. 39, p. 389). Since the orbital period of Uranus is almost exactly 84 years, it is easily deduced that Uranus would be in the same holiocentric longitude (conjunction) with planet X about every 106 years. If planet X was in longitude 289 degrees in 1682, it was in conjunction with Uranus about 1763 and 1869; and in opposition about 1710, 1816 and 1922. When two planets are in conjunction with respect to the sun (heliocentric) their mutual gravitation causes the inner one to move outward, thus losing velocity and longitude. The converse occurs when they are in opposition (180 degrees apart), the inner planet then gaining velocity and longitude. This explains, I believe, why Pickering's three dates of maximum gain in the longitude of Uranus agree so closely with my estimated dates of opposition of Uranus and planet X. That the orbit of X is nearly circular is indicated by the regular spacing of peaks in the tree-ring cycles of 22⅓ and 67-years, which are harmonic with the 402-year cycle. It is evident that the 22⅓-year weather cycle is harmonic with the so-called "11-year" sunspot cycle, for alternate peaks of the latter differ too little from peaks of the former to be accidental.

Since X probably was in longitude 289 degrees when it caused the tree-ring peak of 1682, and since its orbit is nearly circular, it is now about heliocentric longitude 164 degrees. It is probably close to the ecliptic, for the orbital planes of all the giant planets are close to that of the earth. The perturbations of Uranus cited by Pickering indicate that their cause is a giant planet. This is confirmed by the amplitudes of the tree-ring cycles caused by X and by the amplitude of the "11-year" sunspot cycle; for while those cycles are probably due to currents of electrons magnetically induced, the mass of magnetic material in a planet probably increases with its mass. Susceptibility of iron to magnetic induction by streams of electrons increases as its temperature decreases; hence it is possible that X has less mass but lower temperature than any other giant planet. The amplitude of the 67-year cycle in tree-rings (due to X) exceeds that of the 27.46-year cycle (due to Neptune) and that of the 14-year cycle (due to Uranus), in spite of the fact that X is nearly three times as far from the sun as Uranus is.

That the amplitude of the 402-year weather cycle is great is shown by series of recessional moraines as well as by series of calcareous rock strata. By means of varves (annual layers of sediment) I have found that such series often record a cycle of the order of 400 years.

In previous articles I have outlined an electron theory of cycles due to planets, in which streams of electrons are inferred to flow from the sun in heliocentric longitudes that are invariable, the strongest streams being in longitudes 289 and 109 degrees. When a planet crosses one of these streams its magnetic field increases its intensity. Probably there is a return current from the planet to a magnetic pole of the sun. Near the peak of any electron cycle caused in the sun by any planet, there is an increased efflux of solar electrons in low latitudes. This increases the electron charge in the earth and its atmosphere when the earth crosses a stream of solar electrons. Since electrons tend to reflect the photons of radiant waves, less heat reaches the lower atmosphere of the earth at such times. This cooling of the lower atmosphere is conducive to rainfall; so, also, is the presence of more electrons, for they serve as nuclei of condensation. Increased bombardment of the earth by solar electrons increases the magnetism induced in its ferriferous crust and core, thus causing deformation of the earth and movements of its crust, as well as increase in its magnetic field. This explains the frequency of earthquakes near sunspot maxima.

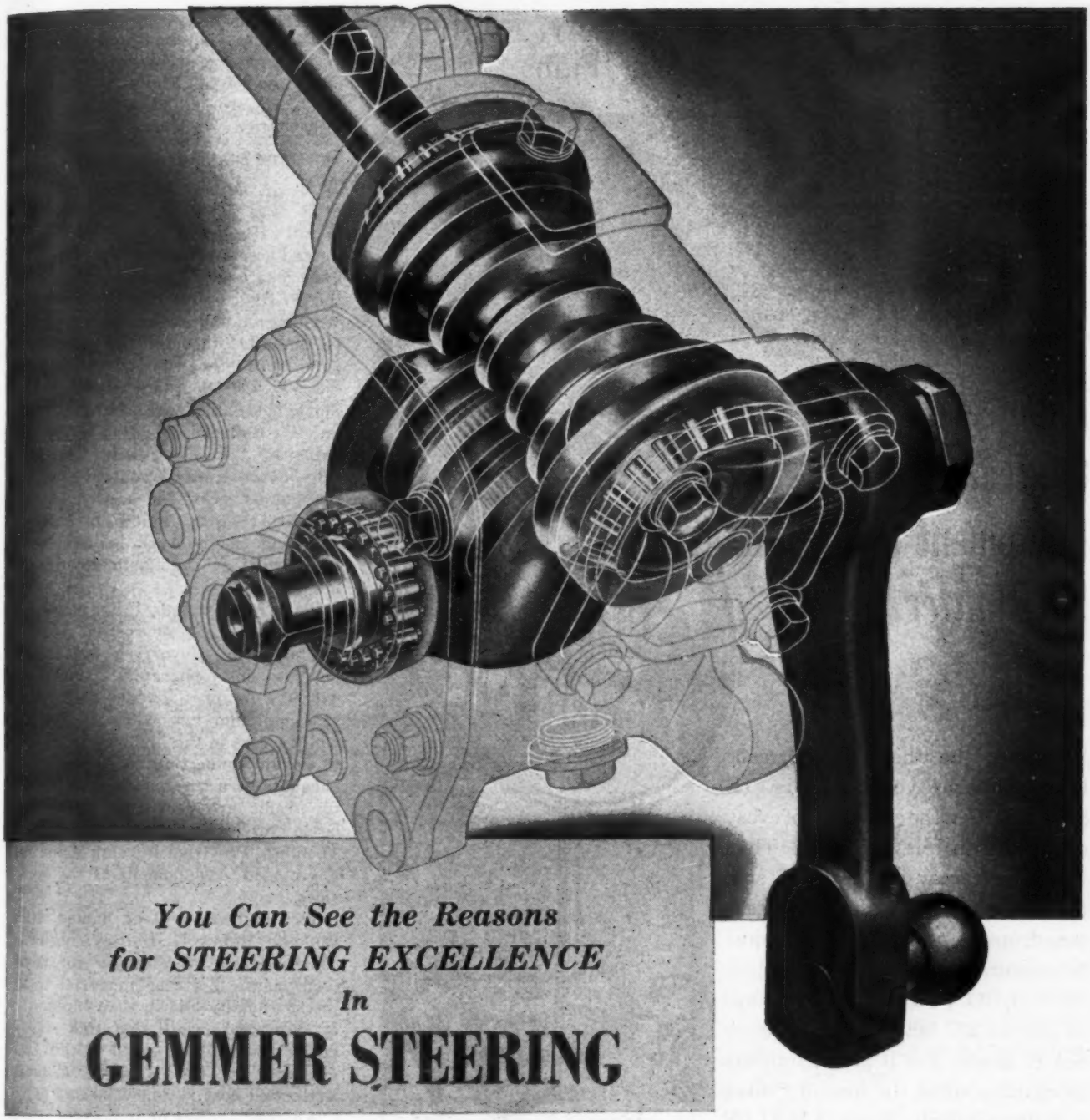
Electrons moving in a magnetic field tend to move spirally, in accordance with the Faraday principle of magnetic rotation of electrical currents. This explains, I believe, the vortex nature of sunspots. Electrons emitted spirally by the sun must have magnetic polarity and, therefore, be attracted by the pole of a planet having opposite polarity.

In a forthcoming 80-page booklet on Cycles and Their Causes, data will be given supporting this electronic theory of cycles. The lengths of cycles and dates of their maxima and minima will be given; also correlations of different kinds of cycles. A copy of the booklet will be sent on request. Address Gillette Publishing Co., 330 South Wells St., Chicago 6, Illinois.

▼

New Construction Price Ceiling

Beginning Aug. 26 the construction industry has been confronted with a new regulation establishing ceilings for construction services. Revised Maximum Price Reg. No. 251, which became effective Aug. 26, fixes the price of construction work at the highest unit rate charged for the same kind of a job during March, 1942. If material cost has gone up since March, 1942, the contractor may add to cover the increase, but this must not exceed ceiling prices. Also, labor increases up to and including Oct. 3, 1942, may be added. If higher wages are paid than those prevailing on Oct. 3, 1942, the contractor must obtain OPA approval to add such increase to the ceiling price, unless such increase is otherwise authorized.



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H. G. Shirley Memorial Highway, Feature of Virginia's Post-War Plans

By R. P. ELLISON
Executive Assistant
Virginia Department of Highways, Richmond

THE initial post-war highway construction program now being prepared by the Virginia Department of Highways involves ninety-three million dollars. This includes some of the most urgently needed projects, and will be materially supplemented as time goes on. Plans and estimates are being prepared now for immediate use when victory is achieved and worthwhile work programs will be needed for employment.

To this end, J. A. Anderson, State Highway Commissioner, and the State Highway Commission, are aiming at a well-balanced and geographically distributed program of projects.

The Virginia program includes several large bridges, a limited access highway, reconstruction and widening of major routes, and the building of major highways to by-pass congested cities and towns. Elements of utility, safety, beauty and economy are being incorporated.

17-Mile Expressway

One of the most outstanding of the projects is the Henry G. Shirley Memorial Highway, to be the first limited-access highway in Virginia. This road begins at the south end of the Pentagon Building Network in Washington and extends in a southerly direction through the northwest portion of the city of Alexandra, crosses the Southern Railroad at Springfield, and parallels the R. F. and P. Railroad from a point just north of Lorton until it intersects U. S. Route 1 near Woodbridge at the Occoquan Creek. The section of this road in Arlington County immediately adjoining the network is now being constructed by the Public Roads Administration.

Plans call for four 12-ft. pavement lanes divided by depressed, grassed median strips of varying widths, depending on topography. Curvature will be 1 dig. max.; grades 3½% max. The minimum r/w width is 300 ft., while access to the highway is limited to certain connecting roads for which adequate structures and interchanges for traffic are provided. There will be no crossings at grade on the entire 17 miles. Provision is being made for appropriate development of the roadsides.

This highway will be named after the late Henry G. Shirley, highway commissioner of Virginia for nineteen years. A fitting memorial to an internationally known road builder, it is most appropriate that this memorial highway be located within the environs of the Nation's Capital. Estimated cost is $4,000,000.

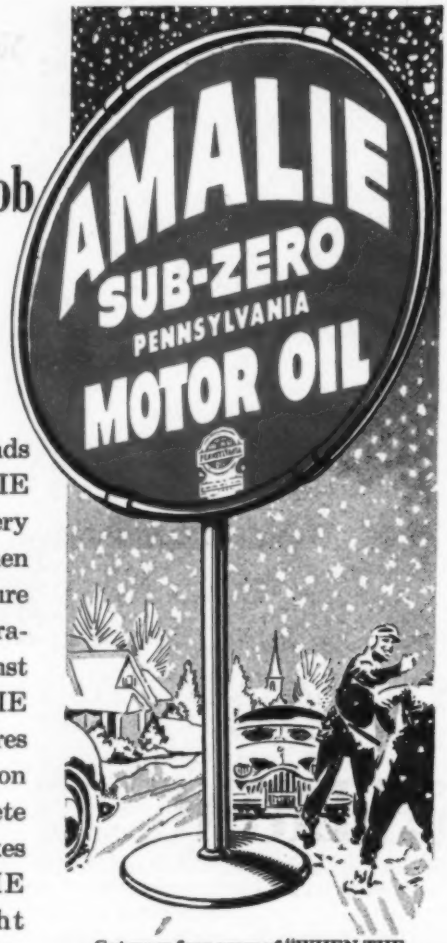
Another project of importance is a high-level bridge over York River at Yorktown, 1,300 ft. long with vertical clearance of 135 ft. Estimated cost of bridge and approaches $4,300,000.

Possibly next in importance are three other major bridge structures:

1. Over the New River at Radford, length 1,475 ft., spanning the river and a rail line; seven large concrete arch spans, symmetrically placed. The central group will be three spans each 228 ft. long, which will be flanked by two 188-ft. and two 154-ft. arch spans. Estimated cost, $700,000.

2. Plans are also ready (contract awarded to Diamond Const. Co.) for the 1,572-ft. Lord Delaware Bridge to span the Mattaponi River at West Point. This bridge will consist of one 250-ft. swing span providing 100-ft.

Engineered to Keep Contractors' Vital Equipment on the Job *All Winter*



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clearance for navigation, and thirty-three 40-ft. reinforced concrete beam spans, pivot and rest piers for draw span, reinforced concrete; balance of structure supported on reinforced concrete piles. Estimate, $400,000.

3. Of special interest is the proposed 1.6-mi. structure to span the James River and the C. & O. R.R. on the outskirts of Richmond. Allocated for project, $421,400.

By-Pass, Other Projects

Immediately before the War, construction was started on a 4-lane-divided by-pass of Route 1 around Fredericksburg. The greater portion has been graded, completion estimated at $700,000.

Among numerous major post-war road projects for which plans are under way or completed are reconstruction and widening of Route 13 on the Eastern Shore.

Route 220 between Roanoke and Rocky Mount, to be reconstructed.

Reconstruction and widening of gaps on Route 1 between Dinwiddie Court House and the North Carolina Line.

Several sections of Route 11, principally between Staunton and Bristol, will be reconstructed for a minimum of three lanes.

Intensive studies are also being made for projects to handle through traffic in a number of congested cities and towns, such as Richmond, Petersburg, Roanoke, Lynchburg, Winchester and Staunton.

The Department of Highways, just prior to the War, adopted revised right of way widths, wherein a 110-ft. right-of-way is to be provided for 2-lane roads, 130-ft. for 3-lane roads, and 160-ft. for 4-lane roads. In all cases, provision is being made for wider shoulders, using a minimum of 8 ft. plus 5 ft. for drainageways.

To properly finance the program for post-war construction and to correct the existing deficiency in Virginia's highway system, an expenditure of approximately $210,000,000 will be required.

The personnel of the Highway Department has been depleted until there now exists 1,796 vacancies in salaried positions, with no applications on file. In the Division of Location and Design, where the vast majority of employees are young engineers of military age, a turn-over of 500% in personnel has been experienced in the past eighteen months.

This division is now operating with a greatly reduced force, resulting in delays in the preparation of post-war plans.

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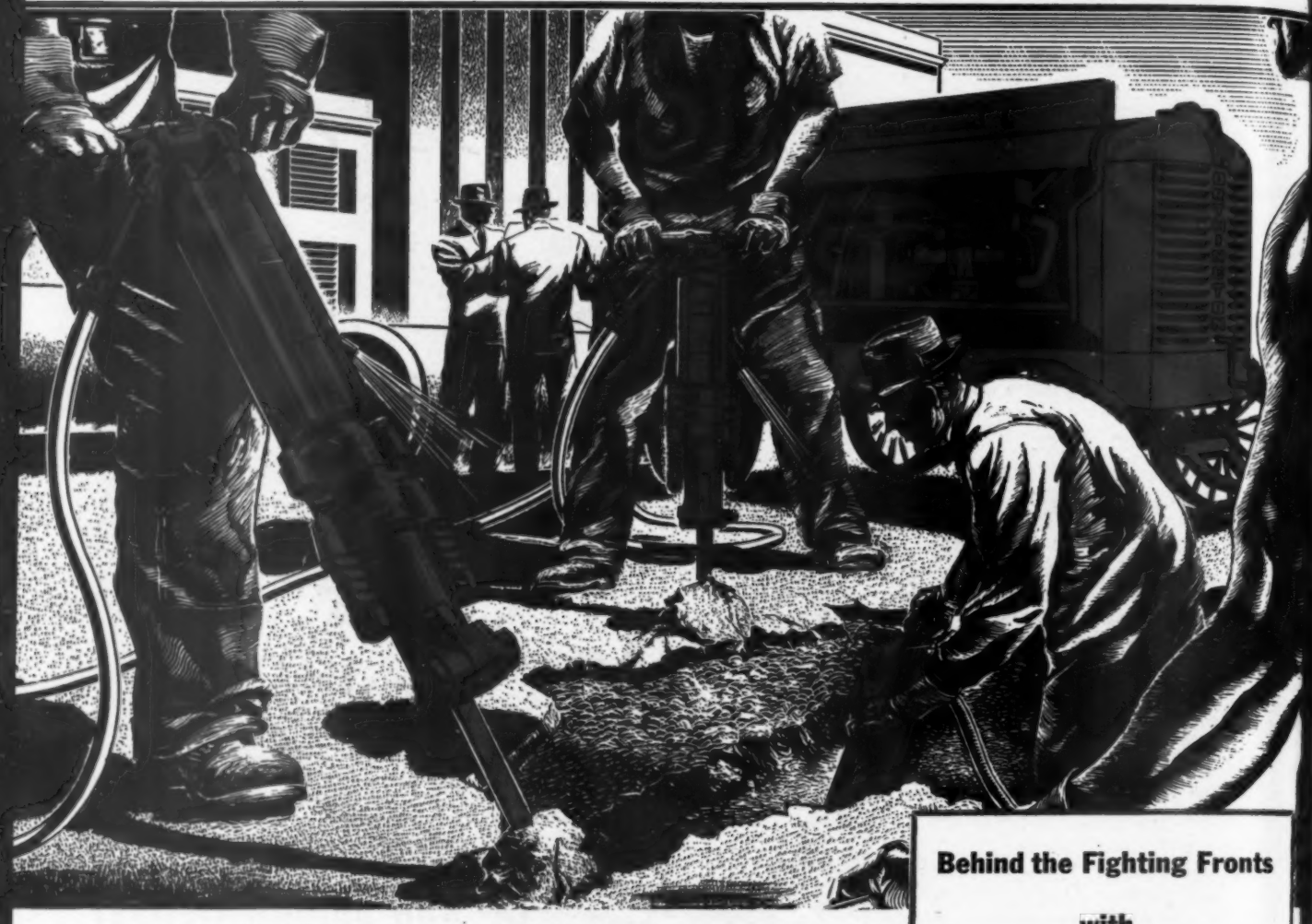

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Extensive area on bridge shown after completion of re-surface. The thin layer of compacted mortar could be walked on immediately, was opened to traffic in approximately 10 hours (Upper view) Vertical structural surface after patching with method described below

Concrete Surface-Patched With Pressure-Vibrated Mortar

(See next page for construction photos.)

BY ROBERT E. WILLEMS

Division Engineer, District 12, Ohio Department of Highways, Cleveland, Ohio.

THE Cleveland division maintenance forces of the Ohio department of highways have recently completed concrete repairs with a method of skin patching local pavement areas scaled from excessive use of chemicals used for ice control.

One instance was the resurfacing of a concrete bridge deck on Bulkley Boulevard in Cleveland. The scaled surface was taken down about 1½ inches with pneumatic pavement breakers. The exposed rough surface was then blown free of dust and small particles, and lightly sprinkled, taking care that no free water pockets formed. Mortar was then applied, consisting of a 3½ gallon, 1-2 mix using a sharp, coarse plaster sand. The mortar when put down was dry enough to just border on the crumbly stage and be fairly workable under vibration. The mortar was first vibrated on the old concrete, to form a bond between the old and new concrete, then additional material added, the vibrator was mounted on a steel strike-off screed to simultaneously vibrate and finish the new surface to the required grade. The vibrating equipment used was developed by a Cleveland manufacturer (The International Vibration Company). The unit is controlled by handles as shown in the accompanying illustration. It applies pressure combined with rotary horizontal (not vertical) vibrations at approximately 7,000 R.P.M., and is driven by an air motor. The bottom of the vibrator is tapered front to back, the front or receiving end being of greater capacity, acting as a throat which compresses the concrete under vibration as the unit moves forward.

Samples of motar resurface thus placed, when later taken out of the pavement, showed that a practically perfect bond is obtained by the above method. The new surfaces have shown satisfactory wearing qualities under the extremely heavy traffic on

(Left): On Bulkley Boulevard, Cleveland. Scaled areas were dug down, loose material removed, surface blown clean of dust and small particles.
(Right): Mortar was placed on small areas to be re-surfaced and "bonded" in by means of the vibrator shown

Bulkley Boulevard (25,000-30,000 vehicles daily). Some patches were made with vinsol resin cement, others with normal portland cement. The patches made with normal cement have shown higher resistance to concentrated chemical applications than is ordinarily expected of such concrete, a quality apparently due to the low water-cement ratio and superior density of the patches.

Because of the compaction and early strength obtained, the patched areas could be walked on immediately without shoe imprint, and were opened to traffic in approximately ten hours.

Application on Bridge Walls and Other Vertical Surfaces

A similar but smaller model vibrator furnished by the same manufacturer was employed to repair the outside face of deck slab and abutment surfaces of a small concrete bridge on which the concrete surface had deteriorated.

The vibrator unit used here has an area of 6 by 20 inches, and is made up largely of magnesium parts in order to make it light enough for use by a single workman as a power trowel. Vibrations are obtained through an unbalanced air turbine, built into the body of the vibrator and operating at 10,000 R.P.M.

The procedure here was to remove all loose particles with small pick hammers, then a thin layer of mortar was vibrated into the rough, irregular surface of the old concrete, passing the vibrator over several times. Then if greater depth of mortar was needed to restore the original surface, additional material was placed and the surface built up without or with partial forms vibrated from the outside.

Initial application and vibration of the first thin coating is the most important part of the procedure, as it is at this point bond is formed between the old concrete and new surface.

If a full 1½ inch or 2 inch thickness is applied in one application, the compacting and bonding effect of vibration under pressure is lost due to the depth of plastic materials which cushion the vibrations.

Repairing Blows-Ups

A larger than average number of pavement blow-ups have occurred this year in Ohio Division 12 area. In several cases blow-ups have been repaired as follows: First the old concrete was cut out on a straight line on either side of the blow-up area, and piled at the side. Next the chunks of old concrete were placed on the sub-grade, the larger chunks to the bottom, and a 1-2 mortar vibrated into the mass. The vibrator is then mounted on a strike-off screed and the top of the repair struck off under vibration to the level of the adjacent concrete road.

The foregoing work was carried out under the author's directions by H. H. Palmer, Division Maintenance Engineer at Cleveland, and M. J. Schneider, Maintenance Superintendent, Cuyahoga County. H. D. Metcalf is Chief Engineer, Bureau of Maintenance, H. G. Sours, Director of Highways.

Two stages in use of vibrator—first as a "bonder," then in conjunction with hand-drawn screed

Blow-up repaired by re-use of concrete fragments, grouting over, and finishing with Pressure-Vibrator and screed

Design Features of Aliso Viaduct, Los Angeles

Elaborate bridges and viaducts will figure increasingly in post-war urban traffic programs. Designers should read with special interest the complex structural and functional problems solved here, as well as the project's evolution

By HAROLD O. SPRINGER
Structural Engineer, Bridge and Structural Design Division, Bureau of Engineering, City of Los Angeles

ALISO Street has figured in the growth of Los Angeles since early Spanish days. The first bridge built here in 1887 was replaced in 1904 by a plate girder bridge. This bridge was inadequate, and traffic was often held up by rail lines crossing at grade at Keller Street and Mission Road (See Fig. 2).

Bridge Long Delayed

A bridge renewal program was sponsored jointly by the city, Santa Fe, Union Pacific and interested electric railways between 1924 and 1930. It originally included Aliso as one of six traffic arteries slated to get high-level viaducts with full grade separation. Unfortunately, both the alignment and grade of the proposed Aliso Street structures were dependent upon location of the proposed Union Passenger Station (built in 1934) and that location was the subject of a long legal battle not settled until 1933. In the meantime, funds originally intended for the Aliso Street Viaduct had been reallocated to another viaduct, and the traffic load had been increased.

Starting in 1936 attempts were made to finance the proposed structure. None were successful until it was accepted as a WPA project in 1939. The highway portion, under the original project, stopped at grade at Mission Road, and electric tracks were carried over Mission Road and the north roadway of Aliso Street on a separate structure leading to a private right-of-way.

Shortly after construction began, preliminary layouts of the proposed Los Angeles Parkway System were completed and it became apparent that a major function of the new viaduct should be that of furnishing a connecting link, free of grade crossings, between three proposed parkways. Hollywood Parkway will connect with the west end of the Aliso Street project and extend westerly through the city to connections with the Chahuenga Pass and Santa Monica Parkways. At the east end Ramona Parkway, already largely constructed, is the principal traffic artery for the northeast metropolitan area. The proposed Santa Ana Parkway will extend southeasterly to the southeast coastal area.

Redesigned for Expanded Function

In order that the completed structure should adequately serve its enlarged functions, it was necessary to redesign and to reissue plans for all portions east of the west line of the Los Angeles River. The street layout and the perspective (Fig. 1) show the resultant final layout which includes four grade separations east of Mission Road.

For about 700 ft. approaching the west river bank, the west approach consists of a 66-ft. elevated roadway with 4-ft. walkways. Service roads 19 ft. wide are provided along each side to serve adjoining property at grade. As the roadway crosses the river it widens to 122 ft. at the east bank, and divides into a main 66-ft. roadway and two 24-ft. ramps. These ramps, No. 1 and No. 2, are respectively for traffic to and from Mission Road, and also carry the walkways down the grade. No provision for pedestrians is made on structures or roadways east of this point.

The main roadway widens from 66 ft. at the east river line to 107 ft. at Mission Road. At this point it again divides, this time into two 35-ft. roadways known as North and South Ramona Boulevard, with a central

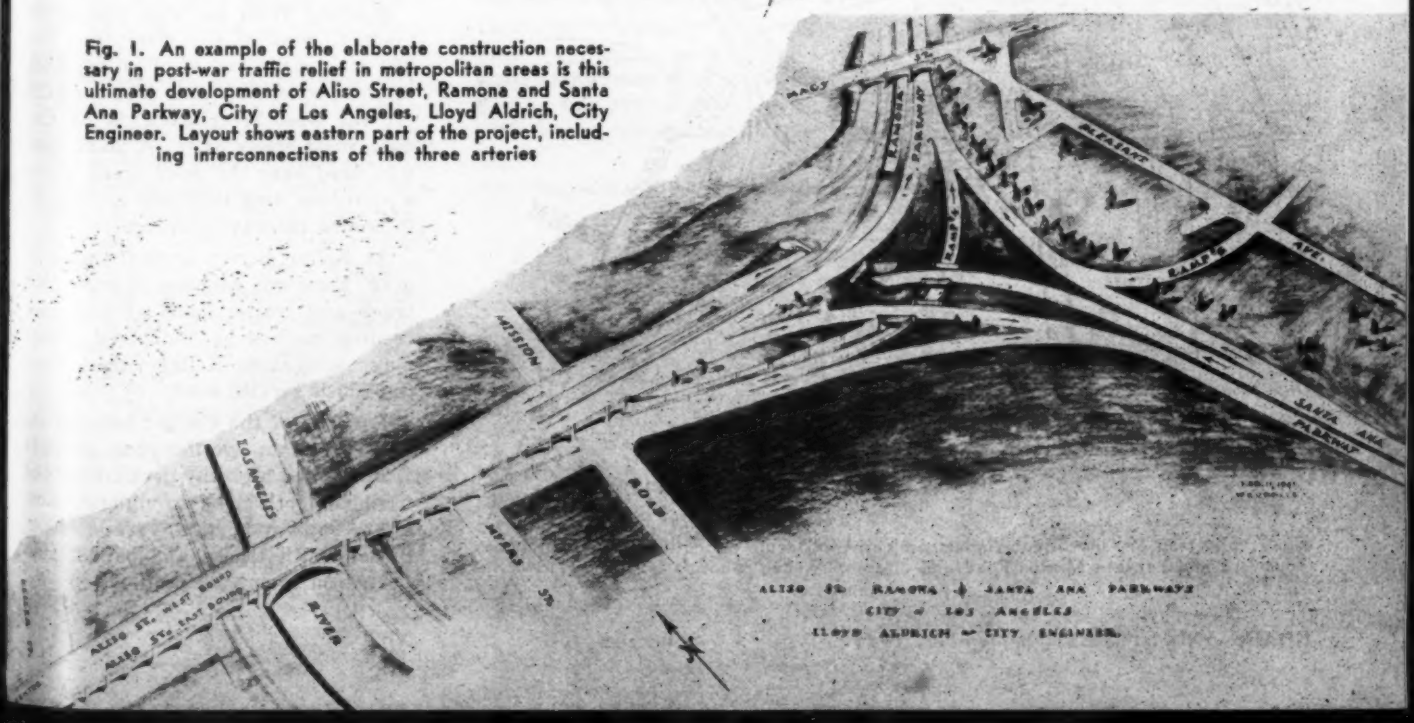


Fig. 1. An example of the elaborate construction necessary in post-war traffic relief in metropolitan areas is this ultimate development of Aliso Street, Ramona and Santa Ana Parkway, City of Los Angeles, Lloyd Aldrich, City Engineer. Layout shows eastern part of the project, including interconnections of the three arteries

Looking north at the completed river span arch

space for the electric tracks, which, up to this point, are paved over for the use of highway traffic, but here enter upon a separate roadbed. The main structure ends 140 ft. east of Mission Road. Beyond there, all roadways and electric tracks are on fill except for the necessary grade separations between roadways.

Landing platforms 150 ft. long, with stairways down to Mission Road, are provided for Electric passengers. From here the Electric tracks extend northeasterly, pass over the middle roadway of Santa Ana Parkway and the north roadway of Ramona Boulevard on grade separation structures, and return to them original alignment and grade just north of the existing Macy Street Bridge.

From Mission Road the North Ramona roadway extends east 450 ft. where it is joined by the middle roadway of Santa Ana Roadway, which has passed over Ramp 4 and under the South Ramona Roadway and the Electric tracks.

At this same point Ramp 3 separates from the North Ramona Roadway and delivers local traffic to Mission Road. The North Roadway then passes under the Electric tracks and Macy Street Bridge to join the existing Ramona Parkway.

The South Ramona Roadway continues at a high level as it leaves Mission Road, passes over the middle roadway of Santa Ana Parkway and then passes under Macy Street Bridge and joins Ramona Parkway.

The west roadway of Santa Ana Parkway leaves South Ramona 450 ft. east of Mission Road and extends southerly to the proposed new parkway.

Summit Avenue provides access for local outbound traffic to Santa Ana Parkway from Mission Road. About 250 ft. east of Mission Road, Ramp No. 4 separates from Summit Avenue, passes under the west and middle roadways of Santa Ana Parkway, and joins the east roadway of Santa Ana Parkway and South Ramona just south of Macy Street Bridge.

All ramps and roadways other than the main structure and the north and south roadways of Ramona Boulevard are 24 ft. wide. Roadways used by the Electric line have a 3½% grade to meet operating requirements. Elsewhere grades do not exceed 5% except for Ramps No. 1 and No. 2, where the short available length, plus railway clearance requirements, necessitated the 7%. All roadways east of Mission Road are one-way only.

Design of River Span Changed

The first design of the main river span contemplated a 2-hinged structural steel arch. This design was abandoned and a fixed reinforced-concrete arch substituted, as being better adapted to WPA work. A decision of the U. S. Engineer Department to permit a 6-ft. encroachment below the high water line in the river channel, should a concrete arch be decided on, materially assisted in making such a change possible. Thus all structures, as built, are concrete.

All structures are designed for such of the following loads and forces as apply—dead load, live load (H-20 and Cooper's E-35), impact, longitudinal force, earth pressure, shrinkage, temperature variation, and seismic forces. In addition, plastic-flow stress distribution was considered in the design of the river arch.

Variable Depth Design on West End

Starting from the west end of the viaduct, west of the river, the first 260 ft. consists of a filled approach between concrete walls. The next 620 ft., the west river bank, is on viaduct, most spans 34 ft. A 20-ft. span was used over the spur track where a minimum deck thickness is required to secure railway clearance.

At Kellar Street a 60-ft. span on a 32° skew was adopted, in order that truck and trailer loads of pipe proceeding to nearby industrial plants may swing into Kellar Street from the south service road.

Portions of the viaduct between expansion joints are designed as rigid frames. The highway deck consists of variable-depth slabs throughout; most of the railway portion, variable-depth girders with tracks and ballast supported on a slab between.

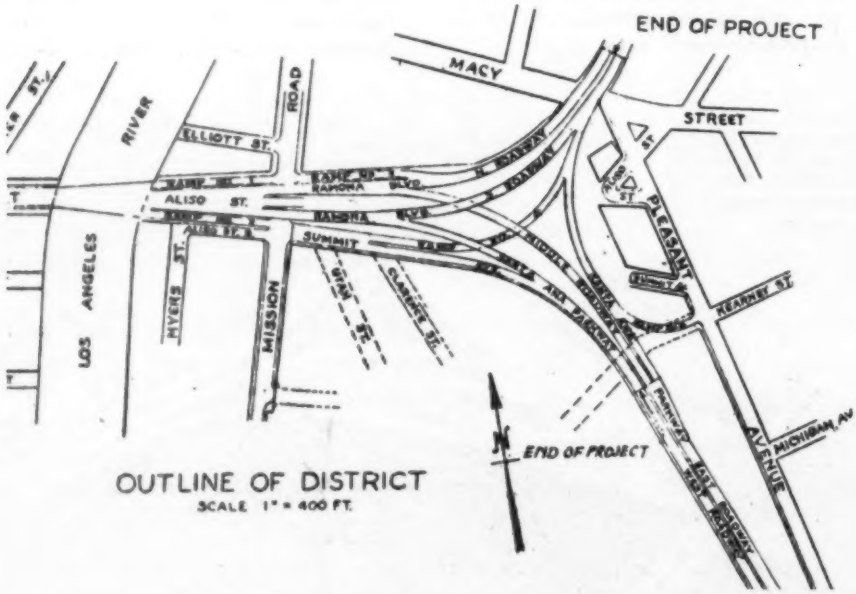


Fig. 2. Site map of Aliso Street Viaduct project. Work south of south roadway of Ramona Boulevard and between Mission Road and Pleasant Avenue is not to be completed at the present time.

Concrete batching plant with the material bins in the background and the entrance ramp for material trucks between

View underneath the 120 ft. Mission Road span during falsework removal. Falsework under the railway rib lowered but not removed

The inter-urban railway rib changes to a variable-depth slab over the steam railway tracks where a smooth soffit is desirable to avoid pockets which could collect smoke and injurious gasses.

Paving and curb details for the lower roadways are arranged to make most of the space underneath the viaduct available for parking purposes. A big gas plant is located on both sides of the west approach and a very large number of important pipe lines up to 5 ft. diam. cross or run along that street. These pipes, together with storm drains, sewers and other utility pipes, governed the design of some of the footings and entailed considerable work during construction.

Details of Large Arches

The open-spandrel river arch includes 2 railway and 4 highway ribs. Ribs vary between 203 and 222 ft. spans, due to fanning of the deck in plan and the skew with the river. Each rib has a parabolic intrados with a 24½-ft. rise. Railway ribs are 9 ft. wide and 5¼ ft. thick at the crown; highway ribs, 7½ ft. and 4½ ft. Ribs are quite slender, having a ratio of spring-line to crown thickness of 1½.

The west arch abutment is of mass concrete supported on cast-in-place concrete piles. The east arch abutment employs massive concrete buttresses, supported on a thick concrete footing slab resting on cemented sand and gravel. Open-design ornamental concrete pylons over each abutment form a distinctive break between the main river crossing and the approaches.

Railway Spans with Variable-Thickness Members

East approach structures west of Mission Road, including Ramps Nos. 1 and 2, are rigid frames with variable-depth slab deck spans of 61 ft. (intermediate) and 42 ft. (end). At Mission Road piers are placed 30 ft. back from the curb lines to improve visibility for traffic entering Mission Road from Ramps Nos. 2 and 3.

The resultant structure at Mission Road consists of a 3-panel, 80-120-80-ft. rigid frame. The problem of designing concrete girders to support an E-35 railway loading on this span was solved by using variable-depth girders with variable-thickness webs just sufficient to resist shearing stresses, and with a bottom slab near the supports, where it was effective in compression.

Wartime Adaptation

Originally the four grade separation structures east of Mission Road were designed as tunnel-type rigid frames, and the retaining walls, necessary where space was insufficient for earth slopes between roadways, were designed of reinforced concrete. Fortunately, the major portion of the reinforcing steel required was delivered previous to the establishment of war priorities. In early 1942, however, it was evident that the steel stock available would be insufficient to complete the remaining work and all east approach structures were redesigned, utilizing mass concrete wherever possible and a combination of scrap steel rails and reinforcing bar remnants where steel reinforcement was essential. The priority situation also made it necessary to abandon plans for driven cast-in-place piles specified within the area extending 500 ft. east of Mission Road, and to substitute uncased 18-in. holes drilled to firm bearing and filled with plain concrete.

A cursory ground examination in this vicinity would not indicate need for piles, but test holes showed soft foundation material to a considerable depth.

Dimensions and Quantities

The length of the main viaduct from the west end to the abutment east of Mission Road is 1800 ft. The project, including appurtenant street, storm drain and sewer work is 3200 ft. overall and 1100 ft north-and-south. Major quantities involved were 60,000 cu. yd. of concrete, 8,000,000 lb. reinforcing bars, 34,000 lin. ft. of concrete piles, 80,000 cu. yd. of structure excavation, 250,000 cu. yd. of grading and 450,000 sq. ft. of concrete and asphaltic concrete pavement.

An ornamental lighting system for all roadways will be a part of the completed project. Along portions traversed by the electric railway, railway wiring poles are also used as light standards. Tunnel structures are illuminated with flush, sidewall lighting units and soffit lights in the bridge deck are provided to light all

After completion of the North Ramona underpass deck and during track laying operations by the Pacific Electric Railway

underneath areas which require such illumination.

A storm drainage system is provided for the entire area. The area east of Mission Road will ultimately be landscaped with trees, shrubs and grasses. With this in mind slopes of cuts and fills have been held to a 2 to 1 slope wherever conditions permitted.

Large Construction Plant

The size of this project warranted the installation of a large construction plant south of Aliso Street between Meyers Street and Mission Road. Included is a batching plant equipped with storage hoppers and weighing equipment for sand, rock and cement. Trucks deposit material via a ramp directly into the storage bins, from which conveyors transfer materials to the batching bins. Transit-mix trucks deliver to pour locations, where elevator towers or cranes are used to lift the concrete to storage hoppers at deck level.

A central concrete mixing plant is also provided for use when desirable. A steel reinforcing storage and bending yard, a lumber yard and wood shop and blacksmith and welding shops, all equipped with power operated machinery, are provided in the vicinity.

Construction by WPA started Nov. 6, 1939, and ceased Jan. 31, 1943. During this period WPA furnished all labor and superintendence and a share of material cost. Property acquisition and property damage claims, supplies, most materials, equipment and engineering costs were borne by the sponsors. The sponsors for this project included the City of Los Angeles, Los Angeles County, State of California, Santa Fe Railway Company, Union Pacific Railroad Company and the Pacific Electric Railway Company.

A contract for completion of the project north of the south curb of the south roadway of Ramona Boulevard was signed October 29, 1943, and completion of this portion was expected in the summer of 1944. A temporary filled ramp from Mission Road to the south roadway of Ramona Boulevard has been under construction by city forces. Completion of the above work will permit opening to highway traffic all parts of the complete project not connected with the future Santa Ana Parkway.

Contracts for the finishing of the southerly portion of the project, including the two structures over Ramp 4, will be let when the man-power and material situation improve.

The City of Los Angeles has acted as agent for the group of co-sponsors. The design, preparation of plans and purchase of materials were handled by the Bureau of Engineering, City of Los Angeles, under city engineer Lloyd Aldrich and deputy engineer of design, Merrill Butler. R. W. Stewart, engineer of bridge and structural design, and H. H. Winter, engineer of rapid transit and street design, were in charge of design and planning. The Bureau of Inspection, City of Los Angeles, under J. F. Burns, inspector of public works, directed inspection of materials and workmanship. WPA construction forces were under Superintendent A. A. Bissell. Ernest Lavine acted as superintendent for the Contracting Engineers Company, who holds the recent contract.

▼

Post-War Notes

The South Carolina state highway department states that it plans to spend $42,964,000 on its federal aid road program during the first three post-war years. The department has a cash balance of $9,925,000 as of May 31, 1944, and this plus current revenues will permit discharging all maturing bonds and interest for at least two years. Including $2,500,000 federal allotment tied up by the war, about $15,800,000 will be available for the first year of construction.

* * *

An inventory of post-war highway improvements needed in Illinois, presented by Chief Engineer Wesley W. Polk, before the House roads committee in Washington outlined $256,250,000 in projects—48% is rural primary, 45% urban primary and 7% secondary. Illinois' problem, he declared, is predominantly one of modernizing the primary system, much of which was paid 20 years ago.

On March 1, 70% of the survey work and 35% of the plan preparation was completed on $114,000,000 in projects which had been programmed. In addition, good progress has been made in the advance engineering survey program authorized by the Defense Highway act; $64,750,000 in authorized projects to date.

* * *

New York City's success in pushing plans preparation for future work, noted, frequently in these columns, got another headline recently when Mayor La Guardia told a congressional committee that $223,000,000 was now available for financing a metropolitan works program of $1,270,000,000. His latest score: 22.5% plans completed, 22.5% plans over half completed, 36% plans started, 19% plans not started.

* * *

The Baltimore city council on July 28 passed a $10,000,000 highway loan ordinance. A proposed freeway is among projects under consideration, as is a tunnel or bridge across the harbor. Voters are to pass on financing at the November election.

* * *

Wayne County, Indiana, county highway supervisor Ernest Coffin and county surveyor George Gault have submitted a proposal to set aside $50,000 annually for 20 years to rehabilitate the county's 3,500 bridges and culverts.

* * *

The Ohio Postwar Planning Commission, meeting at Columbus July 17 was told by highway director Hal G. Sours that the state has completed detailed plans for $22,000,000 in projects ready for sale, $10,000,000 more projects nearly ready. This is 10% of the state's PRA-approved p-w list of 351 projects covering 1,424 miles and to cost $360,000,000.

* * *

A proposed 20-mile belt line around the city of Madison, Wisconsin, under consideration for several years, was approved as a post-war project recently by the Dane Co. Board at Madison. The belt line has been placed on the state trunk system in place of certain other roads of lesser importance.

* * *

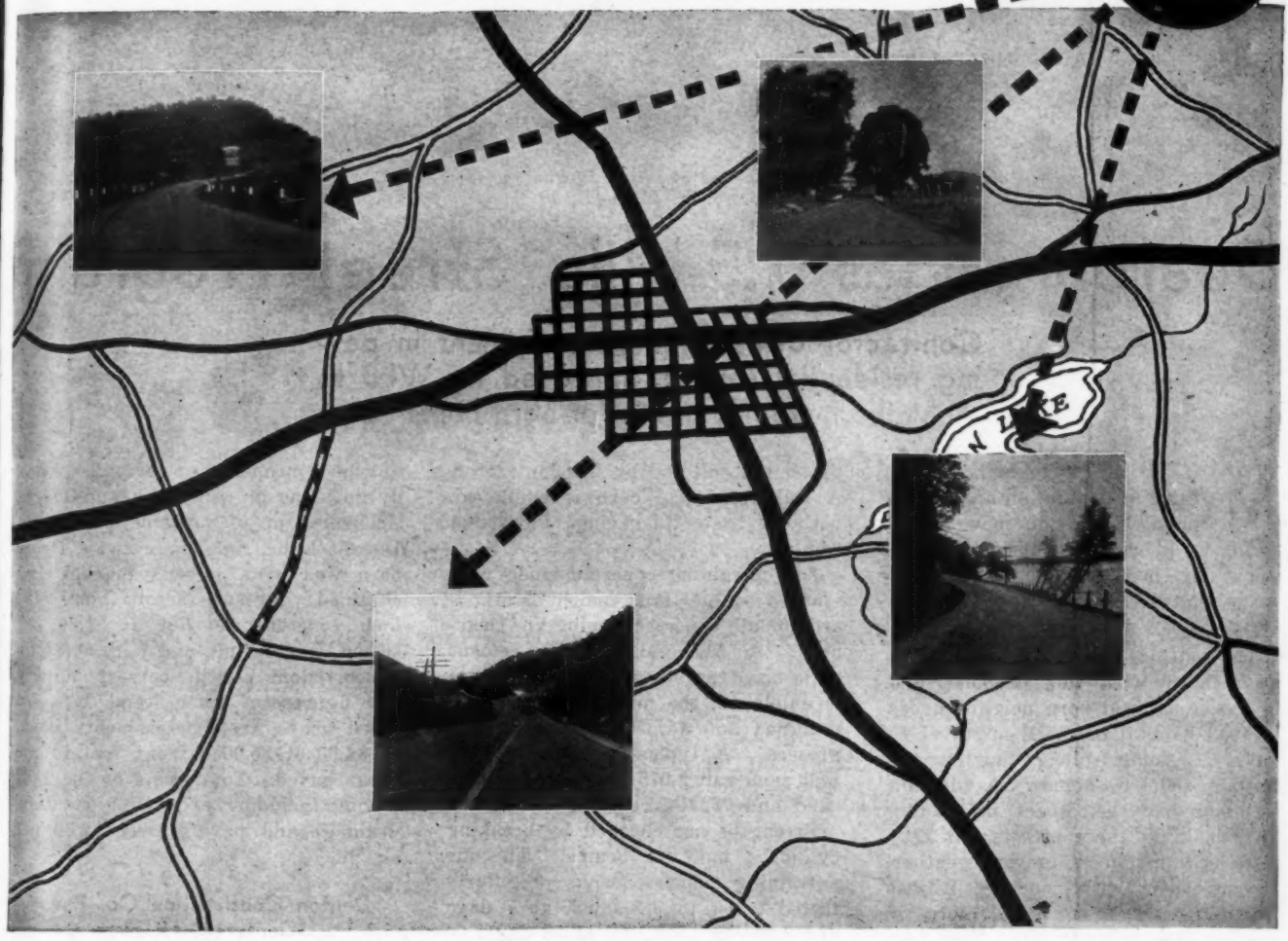
A network of 15 main freeways connecting downtown Los Angeles with its outlying regions, planned for postwar construction from state gasoline tax money, was submitted recently to the Junior Chamber of Commerce by the City Planning Department. These freeways, 450 miles in length, not only will solve the Los Angeles traffic problem but will not actually cost any money, the planning officials explained.

They can be paid for, it is figured, from the saving of gasoline resulting from no-stop traffic. John E. Roberts of the City Planning Department declares motorists on the Pasadena freeway now save a cent a mile or enough to pay for the freeway in 10 years with $1,000,000 left over. The complete freeway system would have $60,000,000 a year, according to his estimates, in gasoline alone to say nothing of oil and tires.

There is only one fly in the ointment, said an article in the *Los Angeles Times*, which questioned the seemingly insufficient parking space in downtown Los Angeles for the number of cars the freeways can carry.

POSTWAR HIGHWAY PLANNING?

It should start at these vital spots



THE U. S. Highway industry is already preparing for its greatest job after the war is won, for today's roads are wearing out faster than ever before and much-needed highway improvements have been unavoidably delayed by manpower and equipment shortages.

Especially in the all-important secondary road system, where regular maintenance is a first requirement, worn out roads are costing this country millions of dollars—in excess damage to automobiles and tires, delaying vital shipments of food and munitions, driving thousands of trucks prematurely to junk piles and seriously impeding transportation.

Why wait to make *your* plans for postwar highway work? Call on the services of the Tarvia field man. He can show you how to plan and prepare needed construction, reconstruction, maintenance and repair using local materials and local labor; how to clear the decks for postwar action.

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New concrete street, recently completed as part of Dearborn's program to take war workers out of the dust and mud

Dearborn Has 7.5-Mile Street Program

Contractor devised novel equipment in paving residential streets, approved by WPB to meet the needs of new War-born home areas

WHEN a city expands one-third in population and blocks upon blocks of new homes spring up in what was once cornfield, something needs to be done about street improvements.

Dearborn, Michigan, grown from 63,600 pop. to 85,000 since 1940, has been faced with this problem, and to rescue its war-born neighborhoods in 1943 it obtained WPB approval to pave 1¼ miles along four streets serving 150 new homes. A substantial sum had been spent in grading and draining these streets but they were still mudholes in wet weather. Paving them with concrete, it was found, would cost little more in money, material and labor than putting down a temporary surface.

With this as a beginning, approval was given early this year for an additional 126,600 sq. yd. to be paved in 1944.

Some 25,100 sq. yd. was carried over from 1943; still more streets are being let this summer. Streets selected are along homes built since 1940.

Concrete Pavement Design

Pavement is 6-in. uniform concrete, going to 7-in. on semi-aterials, and designed entirely without steel. Most streets are 31 ft. back to back of curbs; the semi-arterials are 37 ft. Expansion joints are spaced every block, or 600 ft.; dummies every 15 ft. The slab is thickened at longitudinal keyed, hinged joints, which are spaced on either side of a 20 ft. middle panel, or along the center, according to the method of concrete placement selected by the contractor. A rolled integral curb is employed, without base thickening at street edges.

Air entraining concrete made with vinsol resin portland cement is standard on all concrete paving in Dearborn. A 5½ gallon water-cement ratio six (running 6½ bags cement) is employed, the mix being carefully designed and adjusted as work progresses. A typical mix using slag and sand ran 2,075 lb. slag, 2,180 lb. sand and 752 lb. cement.

Strengths are checked by breaking cylinders but not beams. The air entraining concrete has regularly tested 2,500 to 3,000 psi. at 7 days and 4,000 to 4,500 psi. at 28 days.

While a sand cushion is considered highly desirable, it is omitted along with all frills in an effort to keep the total cost per yard down to where property owners will readily go along on assessments. Due to slackening up of construction on the Detroit Industrial Expressway, Dearborn was in a buyer's market and obtained very satisfactory bids. Six-inch concrete was let at $1.60 per sq. yd. this spring, and 7-in. at $1.75, which along with correspondingly low figures on other items has enabled us to keep assessments down to $4.50 or $5.00 a front foot in the areas paved. Total costs of the 1944 paving including excavation grading, drainage and paving were $2.00 per sq. yd.

Frederick R. Storrer, city engineer of Dearborn, Mich., who is also currently pres., American Public Works Assn.

Denton Construction Co. Paves Center 20-Ft. First

McKay & Sons, of Centerline, one of our 1944 contractors, elected to pave half-width at a time using a finishing machine that struck the slab and curb in one operation. Another contract, Denton Construction Co. of Detroit, is putting in the center 20-ft., first on all streets in his contracts, then coming back and paving the 5½-ft. side section along one side at a time as an entirely separate operation. The street is graded just wide enough to set 20 ft. forms, concrete put in with a 27E paver and usual mechanical finishing equipment. On one of the contracts which involved paving 2,600 ft. (three blocks) along each of five parallel streets, and cross streets between, Denton first paved straight through on the 2,600 ft. runs, next took the cross streets, each in a straight paver run, then came over the same ground again on side lanes (no turn ins,

HIGH EARLY STRENGTH WITH BUILT-IN CURING

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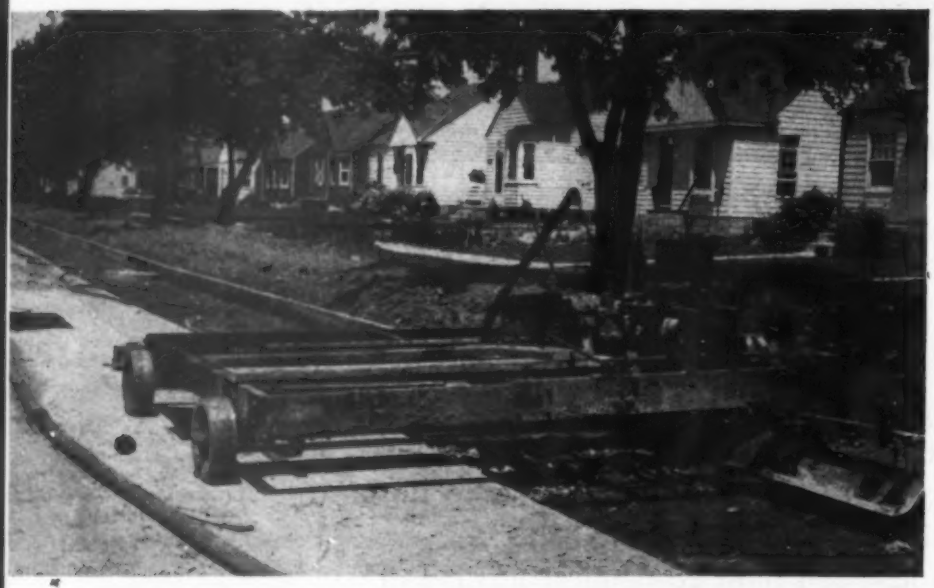
. . . that's the real value of calcium chloride in concrete. Calcium chloride not only doubles the early strengths of concrete, but all tests show greater strengths at all ages tested over many years. Every particle of cement responds to this integral uniform curing reaction.

This simplest and most economical method of curing obviates the necessity of many inspections, and much equipment, material and labor are saved. The economies include the ability to handle a job with a much smaller investment in forms as they may be removed earlier for continued re-use. Calcium chloride also permits quicker, faster finishing, makes more orderly scheduling possible.

Many of these advantages, so very desirable in cold weather concreting, help speed the work the whole year 'round. Write for Bulletin 28, "Early Strength Concrete." It will be sent on request. Calcium Chloride Association, 4145 Penobscot Building, Detroit 26, Michigan.

FOR YEAR-'ROUND CONCRETING

USE CALCIUM CHLORIDE IN-THE-MIX



Home-made screed which strikes off parking-lane strip and molds the curb, all in one trio and with little or no hand finishing. (See text.) With city engineer Storrer (seated) are C. C. Lederman, of Denton Const. Co., the machine's builder, and a visitor, C. H. Cargill, of Oak Const. Co.

merely drop curb), and completing intersections in the process.

Several advantages are seen in putting down the center strip first. Where the contractor has a considerable run of work bunched into one contract, as was arranged in planning lettings, he can make relatively faster "once over" yardage by putting down a 20-ft. simple slab than by paving only 15½ ft. with integral curb. This permits opening the street sooner and also keeps all subsequent operational equipment off the subgrade, permitting an earlier resumption of work after rains. Center strip paving progressed a quarter of a mile a day. The finishing and center-strip machines are also relieved of duty sooner, in event they are needed on some other contract.

After curbing period (liquid membrane), dirt is thrown down temporarily to get property owners in and out of their driveways.

On the side-strip paving operation the Denton firm is using the same paver, but special subgrade rolling and surface finishing equipment designed for this type of contract. The subgrade is rough graded with a motor grader, forms set, and fine grading done by a tractor drawn screed. The subgrade is compacted by means of an improvised tractor-drawn roller, made by filling a section of concrete pipe with concrete.

Reinforced concrete manhole covers and catch basins, furnished by commercial suppliers, are then set in place and the side lane is ready for concreting.

Home-made Screed and Finisher

The Denton Construction Co.'s method of concreting the 5½ ft. parking lane is unique in that this firm has devised equipment which eliminates almost all hand forming and finishing work on the integral curb. As soon as the paver drops a batch of concrete one man spreads it while another shovels concrete up against the curb-height form.

A heavy double screed is then drawn ahead by means of a winch line from a truck parked ahead at the next intersections. This strike-off screed leaves the curb roughly formed along with the flat slab area.

Following immediately is a 100 per cent contractor-built self-propelled finisher which rides the outer form and leaves curb and slab in practically finished condition except for minor touching up with long handled bull float and trowel. The machine consists of two flat screeds followed by a funnel-type curb forming screed or "mule" made of sheet iron. Each of the three screeds is lifted up or adjusted by hand lever.

The construction of this unit is a rather remarkable piece of Rube Goldbergism for which Denton's superintendent, C. C. Leduman, and his shop foreman Walter Smith can take a bow. Its components include an air-cooled gasoline propelling motor from a discarded bull-float, two trans-

Tabulation of Bids on Concrete Paving Received by City of Dearborn, Michigan, June 6, 1944

ITEMS	Denton Const. Co.	Thos. E. Currie Co.	Julius Porath & Sons Co.	Oak Const. Co.	Lewis & Frisinger Co.
13,860 cu. yd. excavation	$ .50	$ .40	$ .50	$ .75	$ .45
29,220 sq. yd. 7" pavement integral curb	1.85	1.90	1.90	1.94	2.00
30,000 sq. yd. 6" pavement integral curb	1.75	1.80	1.80	1.75	1.90
40 catch basins	100.00	80.00	100.00	85.00	100.00
24 catch basins rebuilt	40.00	40.00	50.00	50.00	45.00
8 catch basins adjusted	25.00	25.00	35.00	30.00	25.00
9 manholes	120.00	100.00	125.00	125.00	120.00
25 inlets	50.00	60.00	70.00	40.00	50.00
3,400 lin. ft. 12" sewer	1.50	1.75	1.50	1.75	1.45
11,250 sq. ft. sidewalk	.25	.25	.25	.25	.24
154 stations cleanup	15.00	15.00	12.00	15.00	10.00
Total	$131,199.50	$132,894.50	$134,563.50	$137,619.30	$138,457.00

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Our army can paint a Mack or any other truck to hide it from enemy eyes. But nothing about a truck can be camouflaged from its driver. That fact sent thousands of men home from the front after World War I to become Mack boosters. And this time Macks are even better! . . . Returning service men will know what you mean when you use the words "built like a Mack" to describe something tough and dependable.

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FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

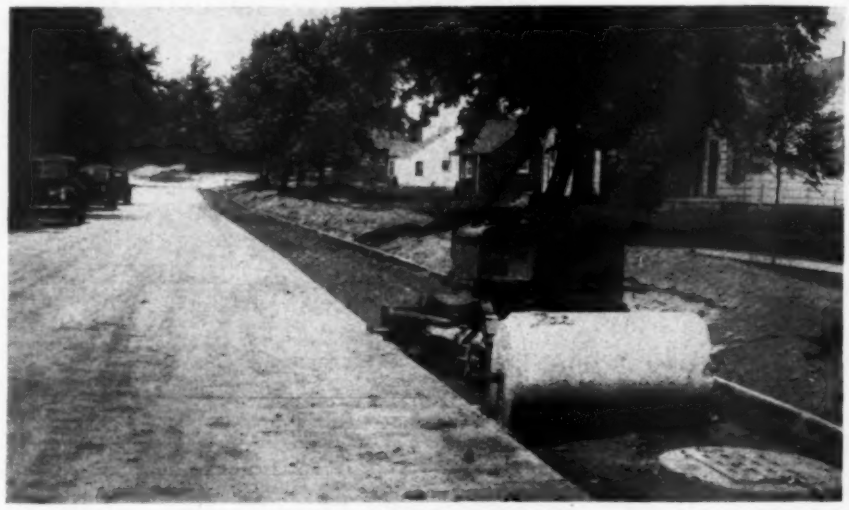
BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

(Left): Heavy strike-off template, also home-made for this job, was towed ahead of the finisher by a winch line from a truck parked at the nearest intersection. (Right): Sidewalk and driveway detail, which city engineer of Dearborn has found effective, in eliminating cracked curbs due to sidewalk shaving. Note that the walk end was rounded with a trowel. This contour doesn't exactly match that of the curb, but is more durable because feathered out edge is eliminated

missions salvaged from an old Ford and Chevrolet, sprockets off of a fine grader, wheel from a finishing machine, drive chain and other parts from junk yards. Leduman is planning to add a tamper which will eliminate floating. Perhaps the one flaw in this unit is that its flat screeds can't be made to oscillate, due to the integral curb. The fresh curb concrete would tend to slump out of its correct cross section during oscillation due to vibration or disturbance of the slab concrete.

Fredrick R. Storrer, City Engineer of Dearborn, is planning another 7 or 8 miles of paving in 1945, and has also found time (and the engineering talent) to keep plans preparation moving to the extent that the entire yardage of a $600,000 post-war street program will be ready to let to contract before the 1945 construction season.



The contractor on this job elected to pave the center strip first. Subgrade roller for the curb strip was made by filling a section of concrete pipe with concrete

Three States Aim to Earmark Motor Taxes for Roads

The battle against diversion of motor tax revenues for non-highway purposes is still being strongly waged with Maine, Nebraska and Washington likely this Fall to join the ranks of the 14 States that have the protection of constitutional amendments, according to an ARBA bulletin.

"It is expected that the amendments in the three States will be generously approved by reason of the public acceptance which has greeted the proposals," said Charles M. Upham, ARBA engineer-director. He pointed out that never yet have voters of any state rejected such amendments.*

"In most states the process of amending state constitutions is slow," he explained. "In Connecticut and Pennsylvania, for instance, anti-diversion amendments have been approved by one session of their state legislatures, and another passage is required before the amendments can get to a vote of the people. Under Kentucky laws, the anti-diversion amendment, approved by the legislature, cannot be voted on by the people until 1945.

"The all-time total of diversion of highway earnings to non-highway purposes is now well over two billion dollars, enough to have built the equivalent of at least 4,000 miles of the finest kind of multi-lane express highway. Diversion is now running, despite restrictions on driving, at the rate of over $200,000,000 a year. Coming directly out of construction funds, diverted money deprives road users of highway facilities which would prevent thousands of accidents and save untold lives and limbs.

"The only way a state may provide itself with adequate, safe highways is by dedicating all highway earnings to highway construction. Motor taxes were created by motorists for the single purpose of improving highways. Emergencies and expediencies brought about diversion as a 'temporary' measure, but in about 29 states, diversion has become a part of the general financing scheme to the detriment of the highways.

"Of the three States voting on amendments this year, Nebraska and Washington now divert to general fund purposes. Nebraska diverts about $2,300,000 per year. Washington diverts about $1,250,000 per year for emergency relief bonds and other purposes. Maine, which does not divert at all, is seeking constitutional protection to prevent any possibility of losing sorely needed highway funds.

"In every case, the states are diverting motor tax revenues to general funds or for specific purposes which should be the obligation of all citizens and not an added burden foisted on road users who alone have a man-sized job in meeting highway needs."

*The 14 States which have adopted constitutional amendments preventing diversion of highway funds are Minnesota, Kansas, Missouri, Colorado, California, Michigan, New Hampshire, Idaho, Nevada, North Dakota, South Dakota, Iowa, Oregon and West Virginia.

Equipment Maintenance

A Modern Contractor's Shop

If we're going to have a 3-billion-dollar post-war road program there'll be need for more well-equipped places such as A. I. Savin's at Hartford, thinks the "Roads and Streets" field editor

FROM the standpoint of equipment maintenance, what kind of contracting organizations will we see when road and street building gets rolling again in a big way?

No doubt, as in the past, there will be outfits that won't want to fool with repairs except the emergency kind necessary to keep the job going. Others will farm out winter motor overhauling or special welding and machine shop jobs. Still others will continue to trade in at season's end and let their distributors or dealers do the mechanical worrying.

But a couple of trends have certainly been accelerated by the late frenzied war effort. One is toward "bigness." The highly equipped, fast moving earthmoving and paving contractors who will be "alumni" of the wartime airport building fraternity aren't just going to sit around and sigh over those million-yard jobs. The 50,000-yd.-per-week earthmovers and big pavers are geared to the Penn Turnpike in their post war thinking.

Their equipment upkeep problem will be big-scale, too. Hence another trend, the companion one toward more highly organized servicing and repair facilities. Forced by wartime necessity, contractors have done wholesale welding and salvage work and set up self-contained motor overhauling shops. In the process of doing these things primarily to expedite rush cost-plus jobs, not a few have been amazed at the money saved in the process.

Hundreds more of the brethren have become used to the idea of taking care of their equipment more systematically, and that alone is progress.

Thoughts such as the foregoing came to mind as we recently visited the modern headquarters shop and yard of A. I. Savin Construction Co., of East Hartford, Conn. Savin, who is one of New England's big operators and has done a large volume of war work, was busy this past summer paving runway extensions at Hartford, and also had other sizable work.

The Savin main shop room is laid out to provide a spacious floor for working on trucks, motors, smaller units and miscellaneous repairs that do not entail dragging in big, bulky equipment. A prime labor and time saver is an overhead hoist rail which runs all around the place. Three chain hoists are provided for fast, flexible handling of work. In addition a fourth hoist operates an overhead arm which pivots around one interior column, for carrying heavy units between a 150-ton hydraulic press and the motor benches.

Motor overhauling work is spread out along tool benches which extend across the back end of the shop. Welding that doesn't have to be done on the main floor is performed in an adjoining room, where there is also a large forge.

Caged apart is a machine shop containing two lathes, a planer, shaper, threading machine, hacksaw, two drill presses, boring bar for cylinders, valve grinder and facer, wrist pin boring unit, bench and portable grinders, etc., in short, equipment for complete precision motor overhauls in considerable volume.

At the back of the shop also is a large solution tank for cleaning scale and varnish, two portable acetylene torch outfits, several small portable electric welders, and a wall rack for certain heavy parts.

One of the best big labor and time savers consists of three hydraulic, pedal-operated bench vises, which can be made to apply clamp pressure, release, or move the jaw to any position instantly without a lot of slow hand lever work.

A separate carpenter shop is set up for building or repairing truck bodies, cabs, other wood parts, and pre-cutting certain form parts at times. And, believe it or not, the Savin firm has a real stock and tool room and inventory system in connection. Ability to replace parts and fill servicing needs quickly from a moderate stock inventory has been a real business asset.

Then outside in the yard, welding and overhauling work on heavy equipment is "spilled all over the place" in busy times. An overhead crane rail supported on heavy H-beam columns serves a concrete paved yard area specially built for the purpose of rebuilding shovels, cranes, steam hammers and other heavy-duty equipment. This layout makes easy work of handling such heavy units as the dump wagon bed frame shown in one of the accompanying photos. (August R. & S. page 70, carried scenes of concrete manhole precasting operations here.)

The Savin firm, with I. Savin in charge of equipment, rebuilt over a hundred motors during the first half of 1944, and the mechanics more than once recently have handled a complete engine overhaul between 4 p. m. one day and 5 p. m. the next.

(Left): Savin's main shop room. (Right): Wartime note. Athey wagon frame being rebuilt after several hard seasons. Gooseneck and housings are from the original wagon; the frame is made from stock plates. An outdoor overhead crane rail lifts such big units as this

Fig. 1. Arrows show pin bearing holes bronze-welded ready to ream. Worn holes on hinge arms were completely filled with welding bronze and new accurate bearing holes bored

(Below) Acetylene torches (one hidden from view) heating the bucket wall and lip preparatory to straightening. Object under man's hand is a section of heavy steel pipe with plates welded across either end, which was inserted to transmit jack pressure as shown in Fig. 2. Pressures developed by a "small" ram and jack outfit like this aren't to be toyed with. You can't be too careful in getting a good anchorage, safe against side slippage

Where does the company get manpower today? Of course, Savin has had his share of the troubles. But some loyal men have stuck. Even today with his volume of contract work below the wartime peak, he has a crew consisting of 4 mechanics, blacksmith, machinist, tractor mechanic and helpers, 2 welders, carpenters and a painter.

Modern Equipment Speeds Clamshell Overhaul

Rebushing clam buckets, which have seen hard use, fitting with new pins, renewing lips and straightening sprung parts are slow work with old-fashioned hand methods—but not in Savin's well equipped shop. Overhauling of the two buckets shown in the accompanying photos is an example of how Savin makes his shop pay.

The bucket in Fig. 1 was set off with a chain hoist, taken down completely with modern hand tools, its fixin' needs listed, and parts that couldn't be purchased at once made in the shop. Worn hinge arm bearings and arm-bracket bearings were bronze welded and rebored (see arrows) and new pins made from salvage steel and inserted. (Large bent nails served as wartime cotter pins). A new lip was made by Savin's blacksmith and riveted on.

While this repair was going on the shop men stopped to fix another bucket (Fig. 2), a heavy-duty 2-yd. unit urgently needed back on a nearby airport job. Whoever had been handling this bucket had sprung or bent the lip and bottom plate on one side. Here again modern facilities saved time. Two acetylene torches, adjusted for a long flame, were applied to the bent plates until plates were dark red. A 50-ton portable remotely-controlled hydraulic jack unit was set up, the jack being braced against the hinge counterweight casting and pressure trans-

mitted to the heated plates through a section of heavy steel pipe and a welded cap plate, as pictured. A hand lever on the ram applied pressure little by little until the heated plate was back in precise shape.

How to Mount Synthetic Rubber Tubes Properly

(From B. F. Goodrich Company)

1. Take the envelope containing the tire talc, which is enclosed in every tube box, and shake it on the tube and bead surfaces, allowing it to sift down in around the tube and inner sidewalls of the tire.

2. Rub tire talc on rim side of tube and on the inside of the tire beads. Be sure to get it spread on, covering the entire rim side of tube and tired bead areas. This is important!

3. Mount tire on wheel, taking special care not to pinch tube with tire irons. *Be sure* to line up valve of tube with hole in tire rim.

Fig. 2. How handy, remotely controlled jack saved time in straightening a 2-yd. clam bucket

IMPORTANT: After beads are seated on the rim, deflate completely and reinflate to recommended pressure.

4. The wheel should be exactly in the center of the tire before inflating. If the wheel is already on the car this means lifting the tire up to center position. The tire should not hang loosely on the wheel while putting in the air.

Put enough air in the tube to seat the tire beads on the rim.

Dirty Diesels Don't Deliver...

An old timer in the business, writing in "The Maintenance Engineer" of the Chief of Engineer's office, Maintenance Division, Military Supply, opines as how feeding your diesel a diet of dirt and water is strictly from hunger. While addressed to Army men who have charge of construction equipment upkeep, this is timely "mark along" reading for contractors and highway department master mechanics, equipment chiefs, shop men and operators

TAKE it from your Uncle Looie, Bub, a diesel will take a hell of a lot of punishment without any back talk, but one thing it *can't* stomach is a diet of dirt and water in its fuel injection system. Only one thing bothers me: the slap-happy way some of you guys handle diesel-powered equipment, *I* may be over long before the duration. So, if you'll pardon the enthusiasm of a guy who's anxious to get back to the wife, kiddies and peacetime diesels, let me get in my two-cents worth of PM [preventive maintenance] while I'm still in good health and of fairly sane mind.

Heart of the Diesel

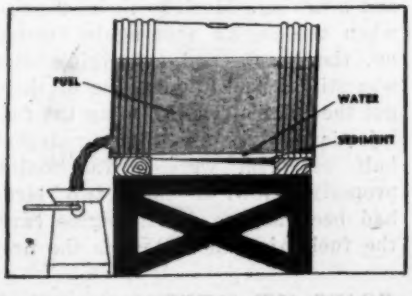
Every operator or mechanic who's been through the mill knows that the fuel injection system is the heart of a diesel engine. Like your own ticker, it is delicate, precision stuff and must be handled with kid gloves at all times. The fuel injection system consists primarily of a fuel pump and a fuel injection valve, or nozzle. Both contain parts machined to tolerances so small that you can't even "mike" them, and that, Bub, is calling 'em

real close. A little dirt or water in the pump or valve can therefore put a diesel out of commission faster than you can lose your pay check in a Saturday-night crap game. So, the first and most important thing to remember is: take every precaution to keep diesel fuel free of dirt and water!

Yeah, I know; where you are you can't drive your tractor up to a nice clean, well-protected storage tank and fill 'er up. Sure, you've got to take the fuel right out of the drum, and the drum's fanny rests right in the dirt, and there's not even an old pair of drawers to hold over the drum to keep off the rain and snow and dust. But despite where you are and what you haven't got, there are still a number of things you can do to help keep the fuel clean, and the dirt and water out of the fuel injection system.

Tips on Storing and Handling Fuel

1. One of the best arrangements I know of when fuel must be drawn directly out of the drums is to build a number of racks such as that shown below, and mount drums on them blocked up with two pieces of wood of different thicknesses so that the front end of the drum is higher than the rear end. This will cause any



water or dirt in the fuel to settle at the rear bottom of the drum and to remain there as long as the drum is not shaken up. Depending on the number of machines to be fueled, it's a good idea to build a sufficient quantity of racks so that fuel in the drums can settle for about 24 hours before it's drawn off for use. If your outfit has to move, there's no reason why you can't pack up these racks and cart them off with you.

2. Always avoid rough handling of drums to prevent scale and other accumulations of foreign matter on the inside of the drum from being shaken loose into the fuel.

3. Whenever a bung cap is removed from a drum, use all care possible to prevent dust, dirt and moisture from entering the drum. Use a clean dry brush to remove dirt from bung cap and the area around it before the cap is removed. Avoid use of rags because it's usually impossible to keep them clean or to prevent them from leaving lint and threads which may find their way into the fuel. At all times, keep bung caps tightly screwed when fuel is not being drawn off. This is especially important in tropical countries where moisture collects around bungholes and may drip into the drum if the cup is loose.

4. Use of buckets, pails, cans and other assorted containers to fill diesel tanks is one of the worst sources of fuel contamination. But since, where you are, you usually have no other choice but to use them, the only thing to do is to be extra careful. This means keeping containers, funnels, etc., clean, and carefully covering them when not in use. It also means inspecting them frequently for dirt and moisture, and cleaning them thoroughly when necessary.

Wherever you are, and whatever the circumstances, remember, CLEANLINESS is the order of the day.

Preventive Maintenance for Fuel Injection System

I recently heard a story of a couple of eager beavers who spent a fruitless week tearing a tractor apart and putting it together again in an attempt to discover the cause of a bad engine knock, heavy black exhaust and misfiring. Much to their surprise when the engine was again started up, the knock and everything else was still there. Finally, one of them got the bright idea of testing the fuel injection valves and discovered that half of them weren't functioning properly. Now, if these two birds had been hep to diesel engine care, the fuel injection system is the first thing they would have suspected. And, having discovered that the valves were on the fritz, they'd have known that the root of the trouble was, in all probability, continued use of contaminated fuel.

Remember those close tolerances we were talking about? Well, any foreign matter carried in the fuel through the fuel lines and into the fuel injection pumps and valves, will quickly cause abrasive action on these very finely ground surfaces. When this happens, it won't be long before you have irregular engine operation such as hard starting, knocks, misfiring, loss of power, and heavy black exhaust. Water in the fuel causes corrosion of these precision parts and has pretty much the same effect as dirt on pumps and valves.

As a general rule, all diesel fuel injection systems are designed to eliminate to a great extent the possibility of water and dirt getting into pumps and valves. Under the fuel tank itself will be found either a sump trap or sediment bowl which should be drained daily before the machine is started and after the machine has been idle for some time so that dirt and water in the fuel has had a chance to settle. But even if the dirt and water get by this point, they can be eliminated further along the fuel system by means of filters which should be drained regularly, and replaced when necessary.

IF you suspect that the fuel is badly contaminated, the best thing to do is to drain the sump trap or sediment bowl first until the fuel runs clean. Then close the trap or bowl and turn over the main engine with the starting engine, if there is one, and open the filter drain. By holding your hand under the drain and letting the fuel drip into it, you can usually tell when the fuel is running clean.

However, if an excessive amount of water gets into the fuel, or if the trap and filters are not drained regularly, the trap and filters will fill up completely and, in such cases, the water will continue on into the fuel injection pumps and valves. You can tell that you've reached this happy state of affairs because, nine times out of ten, the engine will stop running completely. When this happens, the only remedy is to drain the entire fuel system, starting with the fuel tank and including the servicing of fuel filters, in order to get rid of the water.

In freezing weather, water in the fuel injection pumps and valves may freeze and block up the entire system. It may even damage parts of the fuel injection system due to the expansion of the water when it freezes.

Testing Nozzles and Pumps

IF, after taking all the precautions for keeping fuel and fuel system clean, the engine still operates irregularly, and you suspect either fuel injection pumps or valves, first carefully check the fuel line connections to the pump and valve because loose connections or leaks in the line will cause improper firing of the cylinder. If a new fuel line must be installed, be sure to use the correct replacement line for that cylinder since each line has a different shape and the shape affects the functioning of the cylinder. Don't take a line designed for one cylinder and try shaping it to fit another cylinder. It just can't be done properly in the field.

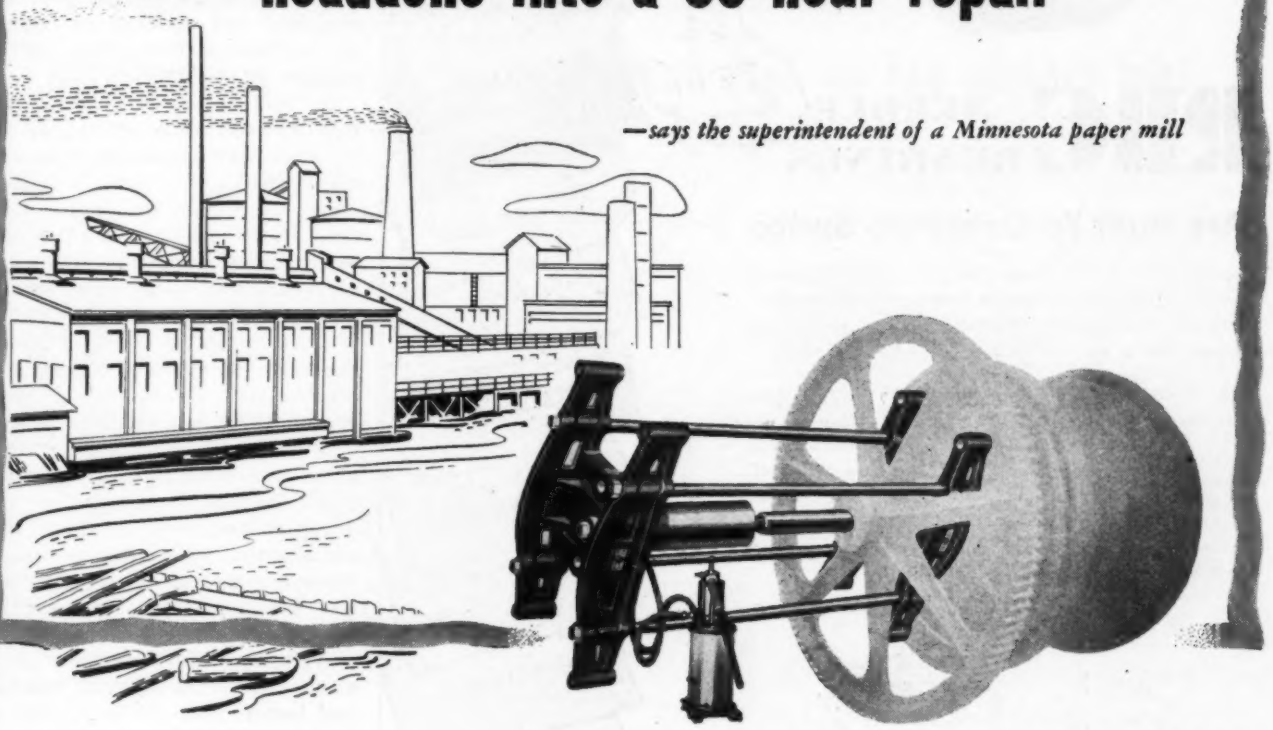
If pump and valve connections appear to be OK, try this simple test next. Run the engine at a speed which makes the irregular operation of the engine more pronounced, and then, taking each cylinder in turn, loosen the fuel line nut or vent plug sufficiently to cut out the cylinder. (That is pretty much the same as testing the firing of a gasoline engine by shorting out the spark plugs.) If loosening of the fuel line makes no difference in the operation of the engine, this is a fairly good indication that either the injection valve or the fuel injection pump for that cylinder isn't up to snuff—assuming, of course, that you know the engine is mechanically OK otherwise.

Now, the $64 question is: how do you tell whether it's the valve or the pump? Well, here's the answer. If your particular diesel has a fuel injection system where the injection valves are separate units receiving high pressure fuel through a fuel line from a separate fuel injection pump

NO. 18 OF A "READY-WITH-A-RODGERS" SERIES

"... your press turned a 10-day headache into a 36-hour repair"

—says the superintendent of a Minnesota paper mill



THE PROBLEM . . . removing and replacing a broken drive gear.

"Our Rodgers Universal Hydraulic Press enables us to make this repair on one of our continuous process machines and get it back into operation in something like 36 hours, whereas it usually took about 10 days before we had your equipment. It had meant burning off gears and sending the work out, tying up our entire production line. Your Rodgers has proved invaluable for this one purpose alone, although we wouldn't be without it for its uses on many other jobs."

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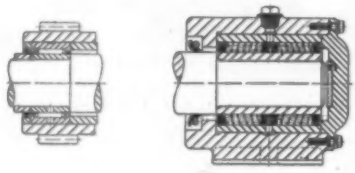
Are Built To Conserve Space

Smaller over all dimensions result in a reduced housing diameter which is an invaluable feature where space is at a premium. The large capacity-small space ratio fits exacting requirements of modern machine designers.

R B C Cyclops and 20th Century needle bearings are of unit construction. Because of this, the bearings are light in weight, compact, and will fit into a smaller space than the ordinary bearing. They are well adapted for the machine tool field. Their light weight and compact size make them practically a MUST for portable tools. Other prime uses are for gear boxes, winches, diesel engines and numerous other applications.

Their small size is a tremendous factor in the wide acceptance and use of R B C aircraft needle bearings and cam followers.



Illustrating the advantage of the compact construction of the 20th CENTURY and CYCLOPS BEARINGS as compared with standard roller bearings.

R B C's ENGINEERING STAFF WILL HELP YOU IN SELECTING THE RIGHT BEARING, AND IN FOLLOWING OUT THE CORRECT BEARING PROCEDURE. LET US KNOW YOUR PROBLEMS.

ROLLER BEARING CO. OF AMERICA
TRENTON, NEW JERSEY

(this will include fuel injection systems manufactured by Caterpillar, Bosch and International) make the following test. Disconnect the fuel line from the injection valve and remove the valve from the cylinder. Then reconnect it to the fuel line, crank the engine at low engine-starting speed and open the throttle. If the injection valve is in good condition, it will give a fine, even spray. When making this test, do not bend fuel lines out of shape, and be sure to brush off all dirt around the valve before removing it from the engine.

And one other thing: **Don't place your hand, or get any other part of your body in the path of the fuel spray.** The fuel comes out of the valve at tremendous pressure and may puncture the skin and cause a bad infection.

If this test shows that the injection valve is in good condition, you may then reasonably assume that the valve and fuel injection pump are OK and that the trouble lies elsewhere. If, however, the injection valve gives an uneven or irregular spray, or if it drips, the chances are that the valve is defective. Your next move, therefore, is to replace this suspected valve with a new or reconditioned valve, or with another valve from the engine that you know is in good shape and repeat the above test. If the spray from the new valve is the same as the spray from the old valve, then you may reasonably assume that the fuel injection pump is defective. **Remember that replacement and servicing of fuel injection pumps is at least a "third echelon job" and should under no conditions be attempted by personnel not qualified or equipped. [In civilian parlance: See your distributor or factory Rep. . . .]**

In fuel injection systems where this injection valve spray test can't be made, try replacing a suspected valve with a new valve or with another valve from the engine that is OK. If the cylinder operates in the same defective manner when either valve is used, then again you may assume that the fuel injection pump is at fault. In any case, whether it's the valve or pump, first and second echelon GI's should not attempt to service them but should call on the higher echelon boys who have the savvy and equipment to do the job right. Be sure, whenever you replace an old valve with a new one, to use the caps that come with the new valve to cover openings of the old one before you send it off for reconditioning.

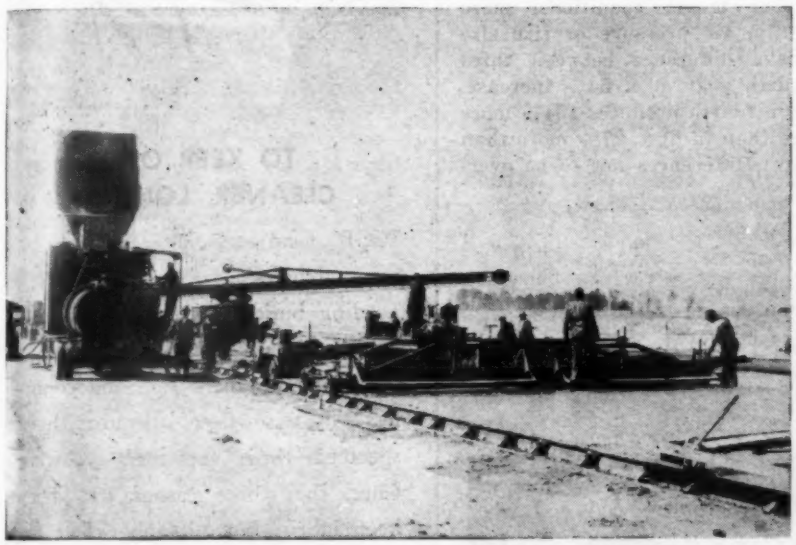
Well, now that I've blown my top about diesel fuel injection systems, I feel better. But I'd feel a hell of a lot better if I knew that all you GI's who handle diesel equipment would take my little sermon to heart. It's the gospel, s'help me!

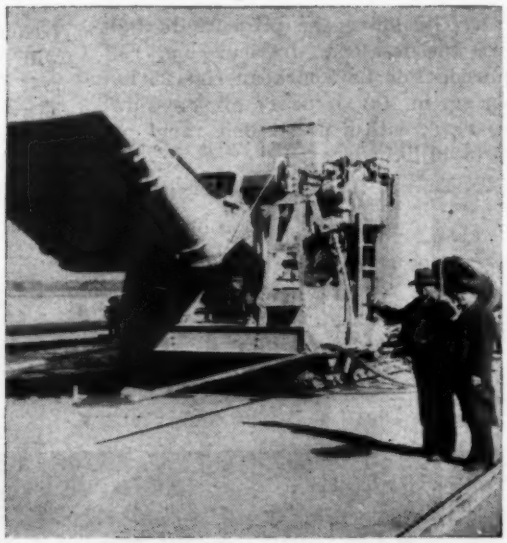
Welding and Cutting Safety Standards

A 32-page booklet entitled "Safety in Electric and Gas Welding and Cutting Operations," issued recently in the series of American War Standards developed by the American Standards Association, is designed to serve as a guide for the protection of the individual operator from injury or illness, and for the protection of property from fire or other damage arising out of improper methods in the installation, operation, or maintenance of welding and cutting equipment. It covers every phase of safety applicable to all ordinary welding, cutting, brazing, lead burning, and flame-treating operations. The booklet costs 40 ct. per copy and may be ordered from the American Standards Association, 29 West 39th St., New York 18, N. Y.

Gulf Quality Lubricants and Fuels

help paving contractor make fast time on big airport job!





Wm. F. Bowe & Company, Augusta, Ga., is ahead of schedule in paving this airport runway extension in Georgia. The job involves laying 160,000 square yards of concrete. In the photograph at the right, a Gulf Service Engineer is shown consulting with Superintendent Charles Davant on the lubrication of paving equipment.

With Gulf Products contractor steers clear of mechanical delays to maintain a rush schedule of 5,000 square yards per day——————

5,000 square yards of concrete a day is the fast schedule maintained by Wm. F. Bowe & Company on this important airport project. Superintendent Charles Davant, veteran of many rush jobs, says, "We help keep our equipment in top-notch condition and avoid mechanical delays under this hard-driving schedule with Gulf quality lubricants and fuels."

There's no allowance in most wartime contracts for breakdowns and delays due to mechanical troubles. That's why a majority of leading contractors on all types of projects keep a Gulf Service Engineer "in the picture" and adopt his recommendations for lubricating and fueling every unit of equipment.

Gulf Service Engineers give valuable assistance on hundreds of jobs by applying lubrication know-how based on years of training and practical on-the-job experience. They help keep contractors' equipment in continuous operation under all kinds of conditions—and maintenance costs at rock-bottom levels.

Call in a Gulf Service Engineer before you start your next job—he will help you complete it more quickly and at a larger profit. Write, wire, or phone your nearest Gulf office today.

BACK THE INVASION . . . BUY MORE WAR BONDS!

GULF

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Maintaining Proper Pressures in Your Scraper Tires

THE importance of watching tire pressures from hour to hour on your big-tired rigs is brought out by R. D. Evans, chief field engineer of R. G. Le Tourneau, Inc., in that firm's publication, "The Co-operator." Big tires have a fundamental advantage in that they carry loads with less penetration or grooving into the ground, and hence need less drawbar pull.

Operating Points Brought Out

1. The lower the pressure in the tire the less the drawbar h.p. required. For Le Tourneau rigs 25 lb. per sq. in. (at or near) air pressure is urged, with a permissible range of 25 to 40 lb.

2. To get the most out of equipment, vary pressures to meet haul conditions. Use 25-35 lb. if soft surfaces predominate; 45-55 lb. on hard, smooth roads. Of course, conditions may vary greatly over a haul round-trip. Rule: Keep the pressure adaptable to the major part of the haul.

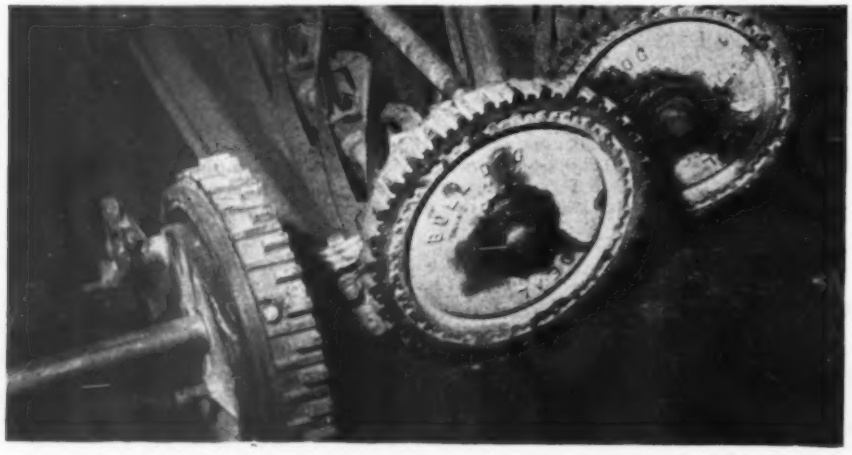
3. By having the right pressures, you can operate in higher gear (more loads per hour). The table below shows the increased yardage for typical units.

First and second gears being for very poor travel conditions, more frequently, air pressure or tire size will make difference between third and fourth gear or a 54% increase. Travel in fourth produces 154% more yardage than in first, 27% more than in third. Differences not to be overlooked!

1,000-FOOT HAUL (ONE WAY)

Gear	Speed MPH	Travel & Return Time (Min.)	Round Trip Time (Min.)	Trips per Hour	Pay Yards per Hour*	Per cent Increase
1st	2.7	8.4	11.4	5.26	63	...
2nd	4.6	4.9	7.9	7.60	91	45
3rd	8.5	2.7	5.7	10.50	126	100
4th	14.9	1.5	4.5	13.30	160	154

*Based on 100% efficiency, 3.0 minutes fixed time for loading, spreading, turning and accelerating.



Oversize Wheels Lift Mower Blades for Rough Ground

Here's a trick of special interest to maintenance executives who have the task of keeping airport turf, roadside shoulders or other rough ground mowed close. In the Atlanta municipal shop the wheels of ordinary fairway mowers were given new oversize rims made in the shop and shrunk on the old rims. This device raises the blade slightly, desirable for rough ground. Data supplied by R. B. Jett, superintendent, Atlanta Department of Motor Transport.

TRANSITS and LEVELS
HEADQUARTERS for REPAIRS – any make

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalogue RS-99 of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

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Mfrs. of Sterling Transits & Levels
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WGB CLAROFIERS ENGINEERED TO THE JOB

TO KEEP OIL CLEANER, LONGER

WGB Clarofiers are adopted by manufacturers, specified for fleets. Leading builders of gas and Diesel engines install WGB Clarofiers as standard equipment . . . and countless cost-wise fleet operators have specified them for their vehicles. Check their three reasons. (1) They keep lubricating oil amber-clear for longer periods. (2) WGB replacement cartridges are inexpensive, and can easily be installed, without tools. (3) WGB Clarofiers are sturdy, simple, trouble-free—built for heavy-duty jobs. Specify WGB Oil Clarofiers for substantial savings in maintenance and operating costs.

Send for your free copy of book describing WGB oil clarofying at work in gas and Diesel engines.

WGB
OIL CLARIFIER, INC.
KINGSTON, N. Y.

LET'S KEEP SEDIMENT OUT OF LUBRICATION

New Equipment and Materials

New Road Curing Blanket

Three new and exclusive construction paper products which have been announced by the Richkraft Co., Chicago, Ill., are a plastic treated curing paper known as "Skufpruf," a road curing blanket manufactured in 10 ft. widths, and the "stringer sheet" method for prolonging the life of curing blankets. "Skufpruf" is plasticized—a concrete curing paper treated with a plastic treatment that insures the qualities of unusual toughness, less shrinkage, and "high wet strength." The plasticizing treatment starts when the pulp first enters the "beaters" and is carefully controlled throughout the manufacturing stages. This process is not a "puddle" or surface treatment, but it is a complete impregnation of the individual pulp fibers with the plasticized chemicals. Manufacturing of curing paper in 10 ft. widths is another of the revolutionary measures extended by Richkraft. Heretofore, no paper has been offered in widths exceeding the usual 7 ft. The change to 10 ft. widths makes possible easier handling, saves money and time, reduces by 25 per cent the labor in sealing laps and provides a smoother rolling blanket unit in the field. On a 22 ft. road for example, Richkraft makes possible 24 ft. 6 in. blankets with two 10 ft. rolls and one 6 ft. roll instead of using two 7 ft. rolls and two 6 ft. rolls. On a blanket 26 ft. 6 in. wide, labor cost is cut one-third. The Richkraft Co. has originated and developed the "stringer sheet" method for prolonging the service of concrete curing blankets. Richkraft will now provide the "stringer sheet," an 18 in. by 60 ft. strip of paper, with the main curing blanket. The purpose of this narrow strip of paper is to eliminate that part of the curing blanket which overhangs the slab. The overhanging edge will ordinarily deteriorate and tear long before the service of the main blanket is fully utilized. Another important advantage of this "stringer" is the amount of time saved while the forms are being removed and the extra time required to cover the "flopping" paper with dirt. The "stringer sheet" is rolled simultaneously with the main roll at the time it is manufactured. After the main roll is spread out on the job, the "stringer sheet" will extend along and beneath the outer edge of the blanket between the pavement and blanket. The "stringer sheet" is simply turned down along the side of the slab after the forms have been stripped and held with dirt.

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Pioneer Engineering Works Builds Oro Manganese Apron Feeder

Pioneer Engineering Works, Inc., of Minneapolis, Minn., have been authorized by the Kensington Steel Co. of Chicago to build the Oro manganese steel apron feeder. The Kensington Steel Co. hold the patents on this feeder, which has several outstanding features. All wearing parts, including pans, rollers, chain bushings, and sprocket teeth are manganese steel. The sprockets on both

Pioneer-Oro Manganese Steel Apron Feeder

head and tail shafts are built with reversible and renewable teeth, made of Oro manganese steel. They can be easily reversed and replaced without removing the sprocket centers from the shaft or disconnecting the pans. Sizes range from 30 in. to 60 in. wide. Lengths vary from 6 ft. to 25 ft., depending on the installation. The pitch of the pans is 6 in. and 9 in. on the smaller feeders, and 12 in. and 15 in. on the larger feeders. Pioneer-Oro Manganese Steel Feeders will be manufactured by Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. They will be sold by Pioneer distributors in the United States and all foreign countries.

▼

Slide Rule Computor for Bituminous Paving Mixtures

A slide rule computor for bituminous mixes to enable paving engineers and contractors to calculate easily and quickly the tonnage needed for any job—from the smallest to the largest—has been developed by Kotal Co. of New York City. The rule is designed to accommodate any variation in the density of the mix—from the most open cold mix to the densest hot mix—any length, width, or thickness desired, from driveways to airport runways. Originally created for use of the Kotal staff and Kotal distributors, these rules have proved of such uniform interest to those who have seen them that they are being made available for engineers, contractors, and others who may be interested, at a price estimated to cover manufacturing and handling costs. At present, the model with a celluloid face is obtainable—at $3.00 per rule—from the Kotal Company, 52 Vanderbilt Ave., New York 17, N. Y. In due course, a plain wooden model will be available at $2.00.

▼

New Grease Gun

A new electric portable power grease gun, Model 7190, the latest addition to the Alemite line of industrial equipment, has been announced by the industrial Alemite division, Stewart-Warner Corporation, Chicago, Ill. The new gun has been dedeveloped to deliver fast, positive high pressure lubrication with all types of lubricants that seek their own level. Equipped with large heavy duty wheels for easy mobility, operation is further facilitated by means of a ball bearing front caster in the steering mechanism. A quiet driving device connects the heavy duty ⅓ H.P. electric motor to a high pressure grease piston and cylinder, made of specially treated and hardened steel, and fitted to close limits to prevent by-passing.

Model 7190 Grease Gun

A mercury switch automatically shuts off the motor when 5,000 lb. of pressure have been built up in the delivery hose. The gun has an easily accessible check valve and pressure re-

lease valve. Equipment includes a 12-ft. electric cord, a 6-ft. ¼-in., 20,000 lb. burst pressure hose and control valve with hydraulic coupling, combination handle, cord and hose rack. The gun stands 28½ in. high, 15 in. wide and 26 in. long.

New Wet Flashlight Battery

A rechargeable wet flashlight battery for industrial use built on the principle of the automobile wet storage battery, especially valuable for operations where long continued and steady usage of flashlights is necessary has been announced by The B. F. Goodrich Co., Akron, O. New type wet cell batteries placed in tests in its Akron factories 18 months ago are still giving excellent service, the company reports. The batteries are being sold with a six months guarantee which authorizes replacement if failure is not due to abuse or misuse. The company claims that the wet storage batteries are more economical than dry cells when flashlight service is required in volume, or where batteries require replacements more than once every two weeks. The batteries give the same light as the industrial type dry cells. A freshly charged wet battery will give about three hours of constant light. Batteries can be used in the standard three or five cell dry battery case with the use of spacer plugs.

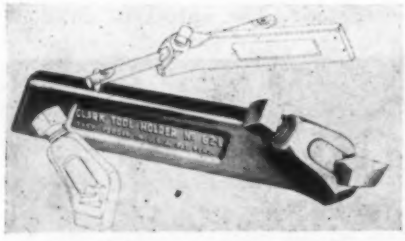
New Motorized Press

All steel construction thruout and simple hydraulic control is is the outstanding feature of the new motorized 10 and 20 ton presses brought out by Reimuller Brothers Co., 9400 Belmont Ave., Franklin Park, Ill. The presses are made in two models of 10 and 20 ton with 10 per cent extra tonnage available. A hand lever hydraulic valve controls the ram movement thru feed, hold or return position.

Pertaining to the press are: hollow large area ram for holding punches and other fixtures, lapped ram, packless design, twin pressure gauges showing pressure and tons. Stroke of ram is 12 in. The motor driven hydraulic pump furnishes 1¾ gal. of oil per minute to the ram giving 1.5 in. per sec. ram speed in the 10 ton and .8 in. per sec. for the 20 ton. The 10 ton press furnishes four complete strokes per min. and the 20 ton furnishes two. Unit is equipped with 220/60/3ph motor as standard equipment. Flexible lines are used thruout simplifying setting up.

New Tool Holders

A new adjustable tool holder with a vise grip for use in lathes, shapers, and planers, has been announced by the Robert H. Clark Co., Beverly Hills, Calif. The exclusive Clark principle of adjustability makes possible the use of any of four or more sizes of tool bits in the same holder instead of requiring a separate holder for each size, thus saving the mechanic's time by enabling him to change bit sizes without changing holders. Models available are the 15° sloping cutter channel type and the horizontal or parallel channel type in both right and left hand offset.



Clark Adjustable Tool Holder

Each type is available in several shank sizes. In addition, the Clark tool holder has a special vise grip jaw which has a unique clamping action for holding the bit vertically and horizontally with pressure evenly distributed over the entire holder channel, thus preventing tool bit breakage. This same "vise grip" offers another important saving by rigidly and firmly holding very short tool bits.

New Clarifier

The Briggs Clarifier Co., 1339 Wisconsin Ave., N. W. Washington 7, D. C., has recently brought out a new standard line of self-contained automatic recirculating clarifiers known as the Dru Series. This new line is designed to solve a specific oil filtration problem. It is a completely self-contained unit with electrically operated pumps and heaters which operate independently of the engine or lubrication system and thus can be adapted to any engine no matter how difficult the system may be to fit. The Dru Series is stated to be especially suited for the lubrication system of diesel, gasoline or natural gas engines where operating temperatures are too low or pump capacities are inadequate for maximum filtration efficiency. The Dru Series is composed of a standard by-pass clarifier, with dual rotary positive displacement pumps and electric heater installed in the base beneath the clarifier. The motor and heater are interconnected on one electric circuit and the entire circuit is protected by an overload cutout. If pumps stop operating, the heater is cut off—positive protection against overheating the oil. Recirculation of oil in the clarifier is independent of oil entering and leaving the unit. This is accomplished with the dual pumps. One pump accurately meters the outgoing oil and the other continuously recirculates the oil through the refills.

New Hole Cutter

A new all-purpose adjustable hole-cutting tool has been brought out by Bruno Tools, Beverly Hills, Calif. This new tool, manufactured by specialists in the field of fine cutting tools, quickly cuts smooth holes in wood, steel, brass, hard rubber, aluminum, fibre, plastics and problem materials which might necessitate use of torches or other expensive equipment. Two sizes are available, each equipped with an easily re-sharpened high speed steel blade. One model cuts holes to any diameter from ⅝ to 1¼

Adjustable Hole-Cutting Tool

in. through ⅛ in. thickness. The other model covers all expansions from 1 to 2½ in. through thicknesses up to ⅝ in. The tools are designed to operate in light drill presses, portable drills, or breast drills and are also available with square shanks for use in hand braces.

New Tread Design for Truck Tires

A new tread design for truck tires of synthetic rubber which is stated to retard the growth of tread cracks and reduce the running tempertaures of the tires by as much as 50 degrees

has been announced by The Goodyear Tire & Rubber Co. In Goodyear's new "Hi-Miler S Rib" tread, as it has been designated, retarding of crack growth is accomplished by altering the conventional, continuous tread ribs to include terminals at approximately every ½ in. in the crevice between the ribs. It is in these crevices that damaging breaks or cracks usually originate. Reduction of the heat is accomplished by a completely ventilated shoulder on each tire instead of the conventional unbroken rib-type shoulder. Laboratory tests have shown that the new type of shoulder will reduce maximum running temperature in truck tires by as much as 50 degrees under certain circumstances.

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Tractor Links on Tractors Repaired by New Welding Method

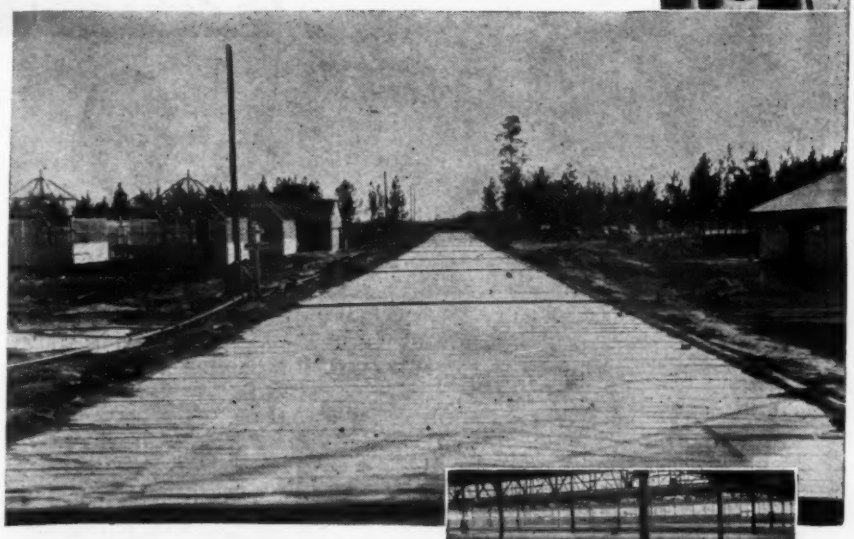
Through the development of special steels for welding, by the Allied Steel Products, Inc., N.B.C., Bldg., Cleveland 14, O., repair and replacement costs and "lay-up time" on repairing tractor links are stated to be reduced to a minimum. The link castings can now be salvaged by welding on to the rail surface, a special steel plate, which builds up the worn surface, restoring the original worn casting to its original weight and thickness. These plates are fabricated to correct sizes to fit the track link casting and are affixed by gas or electric welding. They are made of a special work-hardening steel which becomes harder and tougher with use.

▼

Fuel Oil Filters for Diesel Engines

An improved standard line of round tank fuel oil filters for Diesel engines has been brought out by the Briggs Clarifier Co., 1339 Wisconsin Ave., N. W., Washington 7, D. C. These new DFR models have been added so that flow capacities range up to 500 G.P.H. For small, high-speed Diesel engines, where pressure sometimes runs well above 50 lb. per sq. in. the clarifier is designed for a maximum working pressure of 100 lb. per sq. in. and is hydrostatically tested at 150 lb. per sq. in. For large, heavy-duty Diesels, where pressure is usually between 15 and 25 lb. per sq. in. the maximum working pressure is 40 lb. per sq. in., and clarifiers are hydrostatically tested at 60 lb. per sq. in. Pressure drop across the refills ranges from 0 to 5 lb. per sq. in. on all models.

This Native is Carrying War Supplies Wrapped in SISALKRAFT



IN STEAMING JUNGLES and ice-bound arctics, war goods protected by SISALKRAFT are arriving in usable condition! Thus, weatherproof, tear-resistant, scuff-proof SISALKRAFT, normally used for concrete curing, is helping the war effort.

Directly exposed to wind, rain, ice, sleet, salt water and rough handling, SISALKRAFT is taking more abuse in one trip than it would get when used a dozen times for concrete curing. The strength and waterproofness you need for concrete curing are the properties that enable SISALKRAFT to do such an outstanding war job.

Put SISALKRAFT First in Your Postwar Plans — for dependable concrete curing!

To prevent rapid evaporation of moisture from newly poured concrete — to protect it from "drip" and debris — and for protection from frost — SISALKRAFT has established an unmatched record for low-cost, dependable performance. Used again and again for concrete curing, SISALKRAFT Blankets are finally used to protect subgrade and materials stored in the open. The low cost of SISALKRAFT is appreciated by contractors doing concrete work. It has an unequalled record of nearly 25 years of satisfactory service.

Put SISALKRAFT first on your list of postwar purchases!

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Manufacturers of SISALKRAFT, FIBREEN, SISAL-K, SISALTAPE AND COPPER-ARMORED SISALKRAFT

7 YEARS WITHOUT A BREAKDOWN OR MACHINE REPAIR

Behind this letter is the all-out performance of a General Excavator which has been in all-around municipal service since 1937 . . . with the first repair part yet to be purchased! Here is strong basis for including GENERAL-built equipment in your postwar plans.

GENERAL

Mr. George W. Brown,
Town Superintendent,
Walworth, New York.

Dear Mr. Brown:

Just a few lines to thank you for writing.

It is gratifying to note that you have yet to buy your first actual repair parts for your General Excavator, particularly since this machine was shipped more than 7 years ago. Most folks would expect that a machine of that age, and with the service it has given, would be pretty well worn out — or would have required thousands of dollars in repair expenditures.

In all modesty, Mr. Brown, we do take pride in the way Generals can "dish it out" and "take it," and here's hoping you continue to have the best of luck with your machine. Here too, incidentally, is our promise that after the war, Generals will be better than ever!

Cordially,

THE GENERAL EXCAVATOR COMPANY,

Don B. Smith, Sales Manager

DBS/fb

GEORGE W. BROWN
Town Superintendent
Walworth, N. Y.

. . . *"during national emergency I've personally operated and cared for this General Excavator . . . surprised to find so rugged a machine so easy to handle and keep adjusted . . . in addition to loading bank-run gravel, we use it on tough highway widening jobs—uprooting trees, breaking hardpan rock . . . yet to encounter job too tough for The General."*

And Watch The GENERAL "TYPE 10"

the revolutionary Machine of Tomorrow,

when the swing is to postwar business. Crane-shovel-dragline all in one, this advanced design rubber-tired, one-man, one-engine rig will give you a new lease on profit opportunities in your territory. Write for the details today!

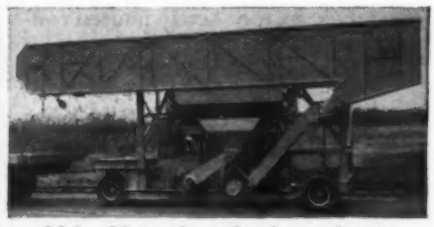
THE OSGOOD COMPANY
SHOVELS, DRAGLINES
CRANES
CRAWLER & WHEEL MOUNTS
DIESEL, OIL, GAS, ELECTRIC

Associated with The Osgood Company

GENERAL EXCAVATOR CO.
MARION, OHIO

GENERAL
CRANES, DRAGLINES
AND SHOVELS
DIESEL, GAS, ELECTRIC

ERIE
PORTABLE PLANT
MAKES CONCRETE
ON THE JOB



• Make 20 to 40 yards of specification concrete per hour on the job. One-man operation and a helper to handle cement bags. One hour to set up. Moves from job to job. Write for booklet.

ERIE STEEL CONSTRUCTION CO • ERIE, PA.
AggreMeters • Buckets • Concrete Plants • Traveling Cranes

With the Manufacturers

Uribe Brothers Appointed Distributors for Kotal

Vicente and Federico Uribe R., Apartado Nacional No. 415, Cali, Colombia, leading civil engineers in Colombia, South America, will shortly introduce the Kotal Process in Latin America. As duly appointed distributors of the Kotal Co., the Uribe Brothers have been assigned the entire nation of Colombia as their territory. Vicente Uribe R. obtained his engineering education both in Rennessaeler. Pollytectnic in Columbia and the United States. Federico Uribe R. has been engaged in heavy construction for some years.

▼

New Directors for LaPlant-Choate

New directors, including many prominent figures in the business and industrial world, were elected at the annual stockholder's meeting just concluded of the La Plant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia. The new directors are: Alfred Kauffmann, former president and current director of the Link-Belt Co., Chicago; Roy Fruehauf, executive vice-president, Fruehalf Trailer Co., Detroit; Howard Hall, president, Iowa Manufacturing Co., and Iowa Steel and Iron Works, Cedar Rapids, and Owen N. Elliott, senior partner of the Cedar Rapids law firm of Elliott, Shuttleworth, and Ingersoll. Re-elected to the board at the same time was Roy E. Choate, president of the company since its incorporation in 1927, and S. E. Coquillette, president of the Merchants National Bank, Cedar Rapids. Archie D. Dennis, secretary-treasurer, was also named a director.

▼

Du Pont Explosives Department Promotions

E. I. du Pont de Nemours & Co. has announced four promotions in the Explosives Department which follow the elevation of Edward B. Yancey from the general managership to a vice presidency and membership on the Executive Committee of the company. H. F. Brown, general superintendent of the department since April 1, 1943, becomes assistant general manager, succeeding W. H. Ward who took Mr. Yancey's place. P. J. Kimball, manager of the Explosives Division for

almost four years, becomes general superintendent. F. R. Wilson moves up from director of production of high explosives to manager of the Explosives Division. J. H. Wellford, who was general assistant to management in the Explosives Department, will be associated with Mr. Yancey.

▼

R. G. Wingerter Promoted by Timken

R. G. Wingerter, for the past six years an industrial engineer for The Timken Roller Bearing Co. has been appointed assistant chief engineer for the Industrial Division. Wingerter is an honor graduate of Wayne University (Detroit, Mich.) and holds a Bachelor of Science degree in Mechanical Engineering.

▼

D. Foster Appointed Chicago Branch Manager Hyster Co.

Donald Foster, Portland, Ore., has been appointed Chicago branch manager of the Hyster Co., with offices in the La Salle-Wacker Building, 221 North La Salle St., Chicago, Ill. C. C. Dunham, former Chicago manager, will go to the Hyster Portland factory as personnel manager. Mr. Foster, with the Hyster Co. for several years, was formerly with the Case Tractor Co. and John Deere Plow Co.

Donald Foster

▼

New Foreign Operations Organization for International Harvester

Fowler McCormick, president of the International Harvester Co., has announced the formation of a new Foreign Operations organization which will be in charge of all the foreign activities of the company, except Canadian operations. The Harvester Foreign Operations organization will be headed by G. C. Hoyt as Vice President, who heretofore has been vice president in charge of foreign sales. C. N. King, formerly manager of foreign sales, becomes Director of Foreign Operations in the new set-up. A. M. Rode, formerly European comptroller and assistant treasurer of the company, has been appointed to the newly created position of Director-General of European Operations, and will have charge of all European activities. J. L. Camp, formerly an

This BITUVIA pavement is now in its FOURTH DECADE of service. The original surface is still intact, and there has been no major maintenance expense.

This new road, built exclusively of BITUVIA, carries the heavy traffic load of a large Midwest war plant.

BITUVIA Road Tar

Dependable Service *for over 40 years*

● **BITUVIA ROAD TAR** has stood the test of more than 40 years service on the roads and streets of America. For war-time maintenance and for peace-time construction, this time-tested material meets every requirement of safety and economy. BITUVIA is easily and quickly applied, penetrates deeply and binds the aggregate firmly, giving a resilient, skid-resistant surface. Available in all grades to meet standard specifications for all types of construction and maintenance work.

A copy of the pocket-size BITUVIA *Manual will be sent on request.*

REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana

2513 S. DAMEN AVENUE, CHICAGO, ILLINOIS 500 FIFTH AVENUE, NEW YORK, N. Y. ST. LOUIS PARK, MINNEAPOLIS, MINN.

SEVENTEEN · PLANTS · TO · SERVE · YOU

RELIANCE

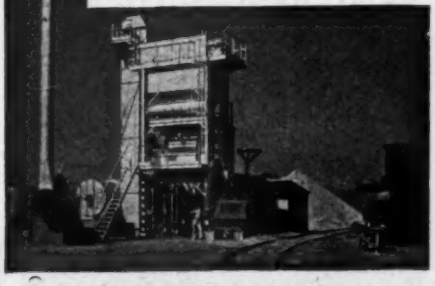
CRUSHING, SCREENING and WASHING UNITS

● Up to 2000 Tons a Day ●

Crushers	Bins	Drag-Lines
Elevators	Pulverizers	"GAYCO"
Sweepers	Feeders	Centrifugal
Screens	Spreaders	Air Separators
Wash Boxes	Kettles	
	Conveyors	

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.
Canadian Representatives: F. H. Hopkins & Co., Ltd. 340 Canada Cement Co. Montreal, Quebec, Can.

PORTABLE ASPHALT PLANTS
High Production—Low Cost



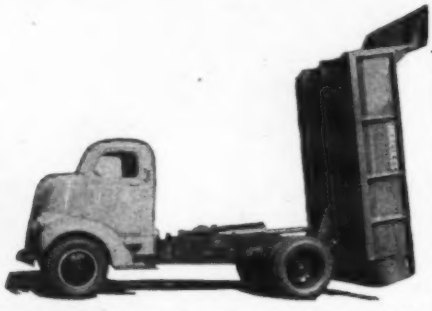
THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

HERCULES

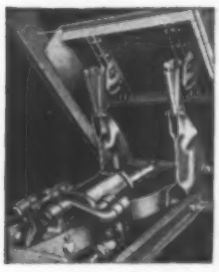
HYDRAULIC HOISTS and DUMP BODIES

GIVE DEPENDABLE SERVICE ON ALL KINDS OF JOBS

Hercules Removable Side Rub Rail Body with hinged rear corner posts. Available in many sizes.



Hercules High Dumper—Power up, power down with 78° dumping angle. Equipped with 12 ton capacity hoist.



HERCULES HYDRAULIC BOOSTER HOIST

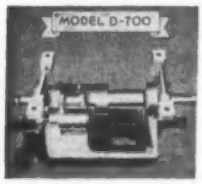
Makes any truck a Dump Truck

Install HERCULES DOUBLE-ARM HYDRAULIC HOISTS under your platform, stake, express or special bodies, which are now idle. Unload the easy way!

This is the Model KXE Hoist, with 6" cylinder, for bodies up to 12 feet long. Body reinforcing plate and steel sills included. Control valve is operated from driver's seat.

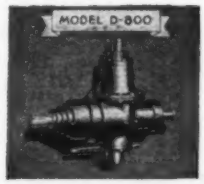
USE THE HERCULES SPLIT-SHAFT POWER TAKE-OFF

To operate any truck-mounted equipment



Direct (D-700 Series), Side (D-800 Series) and Dual Drive (B) models are available for operation of almost every possible type of truck-mounted equipment, either singly or in combination.

Recommendations and complete specifications upon request.



HERCULES STEEL PRODUCTS CO.

GALION, OHIO

South Bend

GUTTER-SNIPE

PICK-UP STREET SWEEPERS

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STREET FLUSHERS
STREET SPRINKLERS
BITUMINOUS DISTRIBUTORS
BITUMINOUS MAINTENANCE UNITS

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Since 1908

MUNICIPAL SUPPLY COMPANY - SOUTH BEND 23, INDIANA

VULCAN PAVEMENT AND CLAY DIGGING TOOLS

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan illustrated CATALOG today.

VULCAN TOOLS — THE WORLD OVER — NOTED FOR QUALITY AND DURABILITY"

VULCAN TOOL MFG. CO.
QUINCY, MASS.

executive of the International Harvester Company Argentina, has been appointed Director-General of Latin-American Operations. Mr. King will be assisted by an executive staff of specialists, who will be designated as managers of foreign manufacturing, sales, engineering, accounting, supply and inventory, merchandising services, and treasury. These executives will be located at the general offices in Chicago. There will be no change in the status of the company's various foreign subsidiaries, which will continue to operate as at present, carrying on the company's business in the respective countries in which they operate.

▼

The Asphalt Institute Establishes Portland, Ore., Office

Bernard E. Gray, General Manager of The Asphalt Institute, has announced that the Pacific Coast Division has appointed W. A. Bugge as District Engineer for the territory comprising northern California, Oregon, and western Washington, with offices at 301 Wilcox Bldg., Portland, Ore., and 1304 Fourth Ave., Seattle, Wash. Mr. Bugge's engineering experience, starting in 1922 in the Washington State Department of Highways, covers 22 years, including long service as County Road Engineer of Jefferson County and during the past four years as City Engineer of Port Townsend. He is a past president of the Washington State Association of County Engineers.

W. A. Bugge

▼

New Distributor for Lima

Lima Locomotive Works, Shovel and Crane Division, Lima, O., has appointed Rupp Equipment Co., 101 Great Arrow Ave., Buffalo, N. Y., as an authorized distributor for Lima shovels, cranes and draglines in Western New York.

▼

New State Distributors for Wood Roadmixer

Additional distributors for the Wood Roadmixer, as announced by the Wood Manufacturering Co., Los Angeles, Calif., are: The G. W. Van Keppel Co., 2440 Pennway, Kansas City, Mo. (entire State of Kansas); and Herman M. Brown Co., First and Sheridan Sts., Des Moines 4, Iowa (entire State of Iowa).

THE OWEN BUCKET CO.
6070 Breakwater Ave. Cleveland, Ohio
Branches: NEW YORK, CHICAGO,
PHILADELPHIA, BERKELEY, CAL.

GRUENDLER CRAFTSMANSHIP
Serving Industry over 50 Years

150 to 200 Tons Per Hour, Crushing Hard Rock

Steam Shovel rock reduced to 5" to " minus in one operation

These heavy plate steel constructed roller bearing jaw crushers have tremendous crushing power, take most severe punishment.

ROLL CRUSHERS
PULVERIZERS
CONVEYORS
CRUSHERS
FEEDERS
MIXERS

The complete weight of above crusher is 54,200 lbs. Size 25x42.

Mfrs. of Portable Jaw or Hammer Crushers and Heavy Roll Crushers

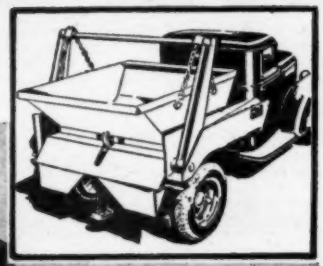
Bulletin mailed on request.

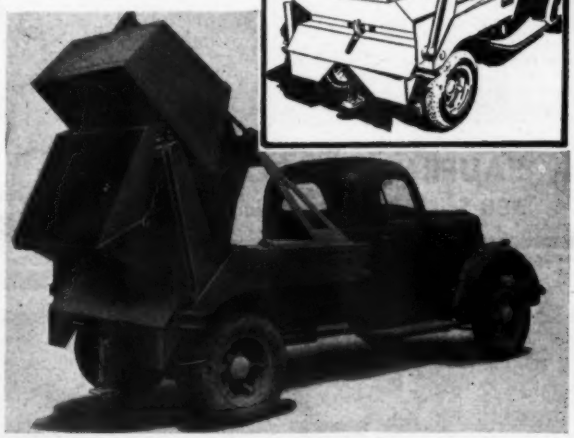
GRUENDLER

CRUSHER and PULVERIZER CO.
2915-17 North Market St., ST. LOUIS (6), MO.

Easier Rubbish Collection

Showing New Enclosed Type Container that fits on Load Lugger in place of regular Dump Bucket.
Write for Bulletin





Brooks LOAD LUGGER equipped with the Enclosed Type Refuse Container (replacing the regular Dump Bucket, as shown above) can be used to advantage by municipalities for collection of garbage and waste in congested sections.
Hotels, restaurants and public buildings can accumulate refuse in these sanitary containers for pick-up by Load Lugger trucks. Also suitable for disposal of street refuse, as containers can be spotted at convenient points.

507 DAVENPORT ROAD, KNOXVILLE 8, TENN.
Distributors in All Principal Cities

Brooks EQUIPMENT & MFG. CO.
KNOXVILLE, TENNESSEE

Powerful UNIT 1020, mounted on a husky 3-axle under carriage, supplies maximum lifting ability. Features include: Hydraulic steering — air brakes — disc clutches — enclosed cast gear case — easy, one-man operation.

UNIVERSAL **UNIT** MACHINERY CORP., Milwaukee 14, Wis., U. S. A.

ASPHALT and TAR KETTLES

FIRE PROOF—OIL BURNING
Hand and Motor driven spray.
Many sizes. Write for catalog.

Elkhart **White Mfg. Co.** Indiana

Big Savings

The above picture of a small Sauerman Scraper digging gravel from pit and delivering to crushing plant shows the simple effectiveness of this method. This Sauerman machine uses 4½ gals. of gasoline per hour to move 45 cu. yd. of material.

SEND FOR THIS CATALOG

The Sauerman Catalog pictures and describes many typical projects where materials are being dug, hauled and placed at costs of a few cents per ton. A copy of this useful book is yours for the asking.

By handling materials the SAUERMAN way . . .

Where materials are to be moved distances of several hundred feet or more, a SAUERMAN Drag Scraper or Cableway can cut the cost per cubic yard to a low figure because it is able to dig, haul and place the material in a continuous, straightline operation. The operation is smooth and rapid, producing large yardage with moderate expenditure of power.

The first cost of a SAUERMAN Machine is reasonable, maintenance amounts to very little, and the simplicity of operation makes it possible to place the control of even the largest installation in the hands of one operator. Moreover, the machine is very flexible, hence it is easy to adapt it to the exact needs of different dig-and-haul jobs.

SAUERMAN BROS., Inc.
588 S. Clinton St., Chicago 7, Ill.

LINN HAFTRAKS with contour-following traction, did the tough work in carving out this airport. . . . . .

The LINN CONTOUR-FOLLOWING TRACTION *Manufacturing Corp.*

Morris, New York

D. W. Sanford Promoted by Goodyear

D. W. Sanford

D. W. Sanford has been named to the resident vice presidency of Goodyear Tire and Rubber Company of California, in Los Angeles. Mr. Sanford, who has been stationed at the Los Angeles Goodyear plant as Western Division Sales Manager for the past two years, succeeds J. E. Mayl, who has returned to Akron as head of the company's tire sales division. Succeeding Mr. Sanford as head of the Western Sales Division is E. L. Mefford, who moves from his post as vice president's assistant in charge of the company's Washington, D. C. offices. George M. Reveire, who has been in charge of the Goodyear export office in Washington, will succeed Mr. Mefford.

▼

Ohnstad Returns to Pioneer

After a two year leave of absence, Orval "Bud" Ohnstad has returned to Pioneer Engineering Works of Minneapolis, Minn. In 1942 Mr. Ohnstad left Pioneer to work as a quarry superintendent for Johnson, Drake & Piper Co. His first assignment was Eritrea in East Africa, where he set up and operated a large Pioneer quarry plant. After one year in the hot country, he finished his job and returned to New York. Immediately, he was hired by the McWilliams Dredging Co. and sent to Greenland to set up and operate two more Pioneer crushing plants.

▼

E. B. Yancey Elected Vice President of Du Pont

Election of Edward B. Yancey to be a vice-president and a member of the Executive Committee of E. I. du Pont de Nemours & Company has been announced. Mr. Yancey since 1935 has been general manager of the company's Explosives Department, and since 1938 has been a member of the Board of Directors. His election to the Executive Committee increases its membership to nine, including the president of the company, who serves as chairman. William H. Ward succeeds Mr. Yancey as general manager of the Explosives Department. He has been assistant general manager since 1935, when Mr. Yancey became head of the department.

UNTIL THE WAR IS WON
. . . highest priorities are diverting the new BYERS excavator you want to war fronts all over the world

In the meantime, **owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.**

For crawler, truck mounted or self-propelled models of shovels and cranes in the portable sizes, see your nearby Byers distributor.

BYERS CRANES AND SHOVELS
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

Buy More BONDS!

RAPIDITY!
UNIFORMITY!
SATISFACTORY!

Contraction joints *MUST* or should be installed within the "opportune" limited time of ten minutes; this requires speed and proper machinery. All Engineers know how disastrous it is to work concrete too wet or too dry.

"FLEX-PLANE" mechanical joint installers for all types of joints—ribbon, premoulded, poured, cork, rubber, etc.

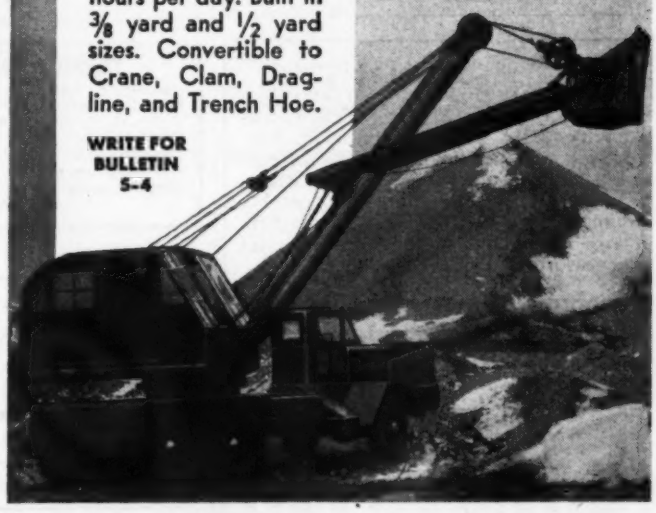
Ask for Bulletin E-11; it "portrays" other things you know!

FLEXIBLE ROAD JOINT MACHINE COMPANY
WARREN, OHIO, U. S. A.

This SHOVEL Gets Around F-A-S-T!

With road speeds up to 30 miles per hour the Mobile Michigan is on the job and earning for you more hours per day. Built in 3/8 yard and 1/2 yard sizes. Convertible to Crane, Clam, Dragline, and Trench Hoe.

WRITE FOR BULLETIN S-4

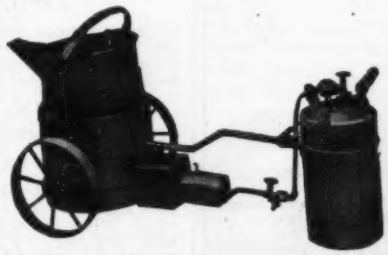


MICHIGAN POWER SHOVEL CO.
BENTON HARBOR, MICHIGAN

CONNERY'S HEATING KETTLE

For speedy heating of tar and asphalt—

Use this CONNERY oil-burning Patrol Patching Heater on the *small* job and this CONNERY oil-burning kettle for *large-quantity* production.



Write for catalog showing our full line of tar and asphalt heating kettles, spraying attachments, pouring sets, etc.

CONNERY CONSTRUCTION Co.
3900 North Second St. Philadelphia, Pa.

Clearing House

FOR SALE

FOR SALE

1—Complete Crushing Plant, capacity 50 to 75 tons per hour, consisting of the following: 36 in. roll. 4x6 triple deck screen, 165-ton Blaw-Knox bin. 30-ft. conveyor, portable pan feeder. 85-ft. elevator. Complete with all electric motors, starters, and accessories. Priced to sell quick.

Asphaltic Limestone Sales Co.
Robert Totterdale
65 E. State St. Columbus, Ohio
Phones: Adams 2676 or University 6307

FOR SALE

Shovels—Cranes—Draglines

Lorain 79 Diesel Comb.
Lorain 75B and 75A gas.
55 Lorain Comb.
No. 7 Northwest, high gantry, extra long cats.
Lima 801 Dragline.
Bucyrus-Erie 50B steam 2 yd.
Marion Model 21 steam.
301 Koehring combination.
37B Bucyrus-Erie.
43B Bucyrus-Erie.
150 P & H Truck Crane.
P & H 10-wheel truck crane.

Caterpillar Tractors

D8 with 30 yd. LaPlante-Choate Scraper.
D7 with LaPlante-Choate Angledozer and 8-yd. Carryall Scraper.
RD8 with LeTourneau Angledozer.
60 with LeTourneau-Choate Dozer.
50 gas with Euclid Hydraulic Bulldozer.
30 with LaPlante-Choate Bulldozer.
30 with Bros Hydraulic Bulldozer.
D4 with LaPlante-Choate Angledozer.
D4 with Trackson High Lift.
D2 with LaPlante-Choate Bulldozer.

Tractors

Eagle 4-wheeled, 3-4 plow, rubber-tired.
Cletrac Model E with power pulley.
T-20 International with Bucyrus-Erie Angledozer.
Two 10-20 Internationals, rubber-tired.

Graders

77 Austin-Western.
99 Austin-Western.

Scrapers

Model J 12-yd. Carryall.
Euclid 5' and 6' Rotary.
Euclid 2-wheel, trailer type.

Miscellaneous

Three Koehring Dumpsters with Cummins Diesel Engines.
P & H Backfiller, completely rebuilt.
Foote No. 26 Paver.
Jaeger 7S Concrete Mixer, power hoist, 4 rubber heavy duty 6-ply tires.

THE CHAS. M. INGERSOLL CO.
19930 Detroit Road Rocky River, Ohio
EDison 1010.

FOR SALE

TRENCHERS FOR SALE

Cleveland Baby, digs 6' deep, 22" wide.
Cleveland Pioneer, digs 10' deep, 26" wide.
P & H 10-30, digs 13' deep, 35" wide.
Buckeye Nos. 1, 2, and 4, dig from 5½ to 6½ ft. deep, 15" to 18" wide.

THE CHAS. M. INGERSOLL CO.
19930 Detroit Road Rocky River, Ohio
EDison 1010.

For Sale

1—9x36" A. W. Crusher.
1—3x10' Revolving Screen.
1—28' Bucket Elevator.
1—Four-Cyl. Hart-Parr Motor.

Box 200, Roads and Streets
330 So. Wells St., Chicago 6, Ill.

TIRE REPAIRS

In all sizes of tractor, truck, wheelbarrow, passenger or 1800x24 tires.
An Equa-Flex "Sectional" repair constructed in your tire is guaranteed. Best results and prompt service!
It is a fact that we do repair run flat tires, passenger and truck, without a reliner!

WALLACE TIRE SERVICE, Inc.
2320 S. Michigan Ave. Chicago, Ill.

FOR SALE:

1—P&H Crane, Model 200, Shop No. 1565 with ⅝ yard bucket, $3,500.00.

1—Huber 10-ton, 3-wheel Roller, Shop No. 29690—$2,000.00.

Box 152, Roads and Streets, 330 So. Wells St., Chicago 6, Ill.

EQUIPMENT WANTED

1—Distributor mounted on good Truck.

Box 153, Roads and Streets, 330 So. Wells St., Chicago 6, Ill.

ASPHALT PLANTS

2 Ton Cummer Stationary.
1½ Ton Cedar Rapids Portable Diesel.
2—1000 lbs. Cummer Portable.
3—2500 and 10,500 bbl. Oil Tanks.

L. M. STANHOPE
304 Conestoga Road, Wayne, Penna.

LIQUIDATION SALE

Liquidating Red Granite Quarry at Lohrville, Wisconsin; 5 Guy Derricks, 3 Gyratory crushers, 1 Symons horizontal disc crushers, 2 electric hoists, grout cars, and numerous other items; 2—75 HP motors, 1 Allis-Chalmers revolving screen, 1—11,000 gallon oil tank; rail, pipe & air receivers; complete inventory on request.

Write
KLATZKY BROTHERS
Calumet, Michigan

HELP WANTED

DESIGNING ENGINEERS: Positions open at Barber-Greene Company for mechanical engineers on design of equipment for road construction, ditching, aggregate handling, coal handling, and general conveying applications.

Barber-Greene Company
Aurora, Illinois

Help Wanted

Progressive industrial concern wants sales engineer for Eastern seaboard, with knowledge of highway accessories sales and service. Knowledge of traffic control helpful. Age 30-38; salary open. Excellent future. Address full particulars to Box 154, Roads and Streets, 330 So. Wells St., Chicago 6, Ill.

POSITION WANTED

Elderly experienced construction man wants position in South or Southwest; experienced on all classes of paving, heavy and fine grading, any kind of sewer work, air ports, etc.; in the best of health, sober and dependable. Best of references. Station F. Box 222, Milwaukee, Wis.

ASPHALT EQUIPMENT

5—½, 1 & 2 Ton Asphalt Plants.
3—½ Ton & 1 Ton Asphalt Mixers.
8—12,000 & 18,000 Gal. Cap. Tanks.
5—800 & 1,200 Gal. Distributor Trucks.
3—B. G. 842 & 848 Portable Plants.

R. C. STANHOPE, INC.
60 East 42nd St. New York 17, N. Y.

FOR SALE

6—2-Cu. Yd. high-discharge 1941 model Jaeger truck mixers at $1250.00 each.
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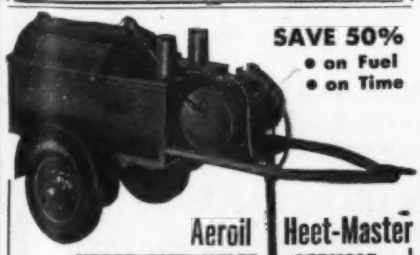

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CORONACH

"Of those immortal dead who live again
In minds made better by their presence."

HOWARD B. COLEMAN, civil engineer, died Aug. 26 at his home in Poughkeepsie, N. Y. He was 60. He had been connected with the New York State Department of Public Works for over 35 years.

▼

BERT ANDERSON, road contractor, died recently at his home at Soldier, Kan. For the past 30 years he had been engaged in bridge and road contracting, mainly in Kansas.

▼

MORTIMER E. COOLEY, dean of the College of Engineering, University of Michigan, from 1904 to 1928 and dean emeritus since then, died Aug. 25, aged 89. He was graduated from the U. S. Naval Academy in 1878. He came to the University of Michigan in 1881 as professor of mechanical engineering. In 1921 he was elected president of the American Engineering Council of the Federated American Engineering Societies, a position he retained for three years.

▼

PROF. EDWARD F. BERRY, head of the Civil Engineering Department of the College of Applied Science at Syracuse University, died Aug. 28. He was 54. He was a graduate of the University of New Brunswick and studied engineering at Lehigh University. He taught at Lafayette and Lehigh University and held engineering positions.

▼

BERTHOLD F. HASTINGS, district engineer of the American Institute of Steel Construction at Philadelphia, Pa., since 1926, died Aug. 11. He was 55. A graduate of the Sheffield Scientific School, Yale University, he taught engineering at Yale, Carnegie Institute of Technology and the University of Pennsylvania.

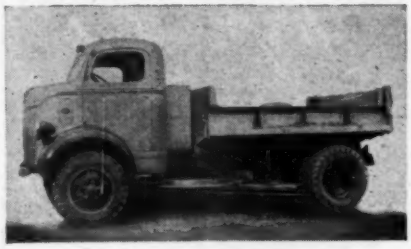
▼

GEORGE S. DONAHUE, assistant county engineer with the state department of public works, with headquarters at Rochester, N. Y., died Aug. 30 of a heart attack while supervising road construction.

▼

GEORGE C. WRIGHT, former county highway superintendent at Rochester, N. Y., died last month at the age of 65. He entered the county service in 1909 and became highways superintendent in 1921, retiring two years ago.

ROOT MODEL-F33 SCRAPER
FOR GRAVEL ROAD MAINTENANCE



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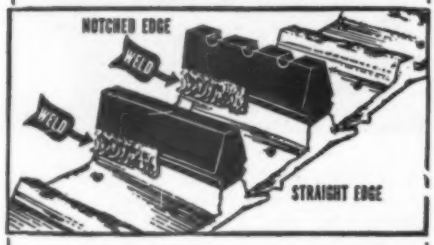

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